

AUTOMOTIVE and AVIATION MANUFACTURING ENGINEERING • PRODUCTION • MANAGEMENT

NOVEMBER 1, 1955

In This Issue

Engineering Features of New Hydra-Matic Drive
Completely Automatic Balancing of Transmission Parts
New Design Changes in Additional 1956 Passenger Cars
Automated Installation for Machining Engine Valves
Frankfort Show Reflects Growth of German Industry
Holding Automatic Transmission Gears to Close Limits

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A CHILTON PUBLICATION

STANDARD technical service clicks at Argus Camera

Personnel at Argus Camera Company were having trouble with the grinding of thread plug gauges. Grinding oils used failed to hold the required accuracy. They called in L. H. Walker, Standard Oil industrial lubrication specialist. He recommended Standard's Superla Thread Grinding Oil A, and Argus began using it. That was four years ago. What happened? Superla Thread Grinding Oil has helped Argus grind thread plug gauges with such accuracy, so consistently, that rejects are virtually eliminated.

Small job? Yes. Small volume of oil used? Yes. But the results are big business to Argus Camera. That makes it important to Standard Oil. It is another demonstration of what this unbeatable combination can do when put to work:

- ¶ Standard lubrication specialists capable of giving technical help.
- 2 Top quality products that deliver results required.

Put this combination to work in your plant. In the Midwest there is a lubrication specialist in your nearby Standard Oil office ready to help you. Call him. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.







(Indiana)

Omer L. Parks (left), tool and gauge grinder for Argus Camera, inspects thread plug gauge with L. H. Walker, Standard Oil industrial engineer. Lyman Walker has been working with customers for 25 years helping them solve problems like the one at Argus. A native of Detroit, Lyman Walker is familiar with the lubrication problems of industry in the territory he serves. This together with his wide experience makes him ideally qualified for this work. Customers find his experience pays off for them.

On big equipment...

to balance high engine speeds—



Reducing high auxiliary engine speeds to those best suited for snow plows is a typical Cotta job. Why? First... because Cotta heavy-duty Reduction Units are low in cost, ordered in large or small quantity lots. Second... maintenance is low, too, because they're built to withstand heavy, intermittent shock loads... give dependable performance on grueling, 'round-the-clock work schedules — indoors or out. And third...

because Cotta Reduction Units are precision-engineered and skillfully assembled by specialists with long experience and know-bow in heavy-duty power transmission work.

If you build cranes, locomotives, drillers, shovels, generators, pumps or other heavy-duty equipment, and you want a standard or "engineered-to-order" Reduction Unit — input torque ranging from 150 to 2000 foot pounds — see Cotta first!

THIS INFORMATION WILL HELF TOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today,

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



"Engineered-to-order"



Silvery white under all atmospheric conditions, chromium-nickel stainless steels offer permanent beauty and unsurpassed performance in the freight hauling field. Type 302 stainless steel with ultimate tensile strength of 125,000 to 150,000 pai is utilized in this new trailer, produced by Fruehauf Trailer Co., Detroit 32, Mich. The stainless steel body components for this new line are designed and furnished by The Budd Co., Philadelphia 15, Pa.

Stainless Steel in new Fruehauf design allows 94" inside width . . . up to 35% more space

HERE'S A STRIKING EXAMPLE of the way the Fruehauf Volume Van enlarges trailer cargo space. It's done with chromium-nickel stainless steel.

In the unit shown above, Fruehauf specifies sidewalls of corrugated stainless steel panels, SHOT-WELDED together for increased overall strength, along with a corrugated stainless steel roof.

This use of thin-gauged chromium-nickel stainless permits an inside width of 94 inches, as well as increased length and height, with no sacrifice of structural strength.

In addition, the stainless steel sidewalls and roof never need painting. And they add years of earning power to these vans, because the chromium-nickel alloy resists attack by the atmosphere and practically all types of loading.

Moreover, it stands up to impact, wear and abrasion. In fact, the builder of these trailers declares that no stainless steel Fruehauf equipment has ever worn out.

So, specify stainless steels to trim deadweight, increase payload, and get maximum on-the-road use of your vehicles. You can draw, spin, forge, weld, solder, punch, shear or bend these nickel alloyed steels.

Leading steel companies produce austenitic chromium-nickel stainless steels in all commercial forms. A list of sources of supply will be furnished on request.



THE INTERNATIONAL NICKEL COMPANY, INC. #2.Well Street

RUTOMOTIVE DUSTRIES

A CHILTON MAGAZINE

PUBLISHED SEMI-MONTHLY

DEPARTMENTS

NOVEMBER 1, 1955

VOL. 113. NO. 9

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (meskly) and the Motor Series (weekly) May, 1993; Desire and Series (mently), October, 1993; the Automobile Marasine (mently), July, 1997, and the Horseless Age (weekly), Sundally INSE, May, 1918.
EDITORIAL EXECUTIVE OFFICES, Chestnet and 55th Sts., Philadelphia 39, Fa., U. S. A. Cable address—Autoland, Philadelphia. Audit Bureau of Circulations

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilico Co., Chestnest & 56th Sts., Phila 29. Entered as Second Class Manter Ortober 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Compress of March 3, 1879. In case of Non-Delivery Return Protage Guaranteed. Subscription price: United States, United States Passessism. 1 part 82-09. 2 parts 82-09.



WORM GEARING-universal in NUXM GEARING—universal in its opplication—affords advan-tages for almost every power fransmission job., Whather you and worm gearing sets or speed went worm gearing sets or speed reducer units; you will find drives to meet your need in the complete Cleveland line. Write for new 180-page Catalos 400, just off press. Pholograph at left of turnet punch Photograph at left of turner punch press, with inset showing built-in Cleveland worm-georing, by cour-tesy of Wiedemann Machine Ca-

CLEVELAND worm gearing drives turret punch press

any machine tool must operate, there is an ideal

Worm gearing as built by Cleveland is rugged, effidrive-Cleveland Worm Gearing.

cient and dependable. It transmits power with a smooth, quiet, steady torque flow. It is compact and space saving. And speed reduction to any desired ratio is possible.

For 40 years Cleveland has devoted its facilities exclusively to engineering and manufacturing highest quality worms and gears. No wonder that so many Clevelands installed in the teens and twenties are still in service.

If you are building or using equipment that calls for worm gearing, of either standard or special sizes and types, just drop us a line. The Cleveland Worm and Gear Company, 3274 East 80th St., Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Mitate: The Parvat Corporation, Centralized Systems of Lubrication, In Canada: Peacock Brothers Limited.





Power for Power-Steering

EATON ROTOR PUMPS with Flour-Control

As a pioneer in the development of pumps with flow-control for hydraulic power-steering, the Eaton Pump Division offers unequalled facilities in both design and production in this highly specialized field. The Eaton high-speed power unit provides the desirable advantage of small, compact design. If you are considering this important addition to the ease, convenience, and safety of modern motoring, there are distinct benefits in permitting our engineers to work with yours in the early design stages.

Pump Division

Extreme Accuracy BULLARD

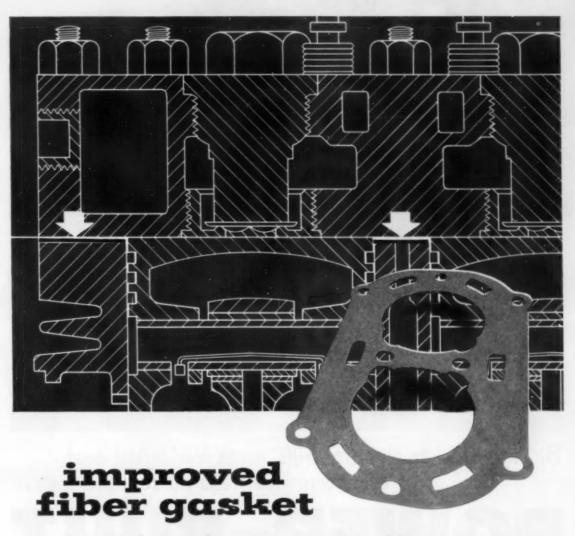
Builders of the Pavo Neptune Anti-Submarine Aircraft, The Lockheed Aircraft Corporation, have this to say concerning their experience with the Bullard Spacer Table employed to machine a cast aluminum support for the Sonobuoy Chute.

"Before we used the Bullard Spacer Table, we put this kind of work (boring 3 holes of 5.250 diameter) either into a jig or on a horizontal boring machine".

"The reason we put this piece on the Bullard Spacer Table is that the holes are too large for a drill jig and dial spacing for hole location on the horizontal was time consuming. What is more remarkable about the Spacer Table is the fact that it can handle such large diameters with the greatest accuracy.

"Another advantage of the Bullard Spacer Table is the simplified tooling. All we need is a simple holding fixture. The spacing is done automatically by the Spacer Table".

these advantages can be applied to your machining problems. Ask your nearest Bullard Sales Engineer or Distributor or writes for Spacer Control



withstands heat, solves maintenance problem

The non-metallic cylinder-head gaskets used by a manufacturer of air compressors crumbled to pieces whenever a unit was disassembled for maintenance. Operating temperatures up to 250° F, charred these gaskets and made flanges hard to clean.

Later, Armstrong CN-705 Accopac® was used in place of the original material. It withstood the high operating temperatures and gave long, dependable service without replacement.

Accopac is made by a patented, beater-saturation process which blends fiber and cork with a non-volatile, non-extractable latex binder. The resultant sheets are uniform, unusually compressible, and impervious at bolting pressures as low as 800 psi,

Accopac is widely used in pumps, aircraft and automotive devices, household appliances, and many other applications.

on Accopac and facts on Armstrong synthetic rubber, cork composition, and cork-and-rubber, look for "Armstrong Gasket Materials" in Sweet's product design file . . or write Armstrong Cork Co., Industrial Div., 7011 Imperial Ave., Lancaster, Pa. Be sure to specify Armstrong materials when you order from your local gasket fabricator.



Armstrong Accopac

. . . used wherever performance counts



Black & Decker electric drills mean low initial costmore convenience, less noise—and they're

POWER-BUILT The power, speed and accuracy of Black & Decker TO LAST!

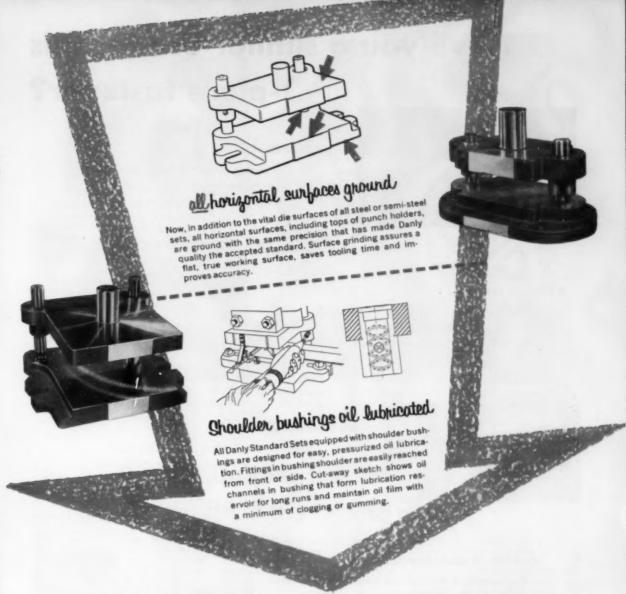
The power, speed and accuracy of Black & Decker Drills mean faster, better production, lower costs! The Black & Decker-originated pistol-grip and trigger-switch, the lightweight, balanced power GUAR-ANTEE reduced operator fatigue! And unexcelled workmanship throughout makes your Black & Decker Drills thoroughly dependable, inexpensive, "low maintenance" production workhorses.

31 models assure you of the widest selection of drills, from ¼" to 1¾"... for intermittent or continuous heavy-duty production or maintenance jobs! Call your Black & Decker distributor or write for a free catalog to: The Black & Decker Mfg. Co., Dept. 1611, Towson 4, Md.

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New features like these keep DANLY ahead

Throughout the years, the rigid precision standards of Danly have made Danly Die Sets the recognized standard for quality. Now Danly Die Sets offer you two new features to save hours in the die shop, make tooling-up much faster and assure longer die life. All new Danly Die Sets have an oil lubrication

system for shoulder bushings and all horizontal surfaces are ground to assure a true working surface for die making. Danly's nationwide system of assembly branches is ready to serve you. Call Danly today.

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Have you a similar use for this 1-piece fastener?



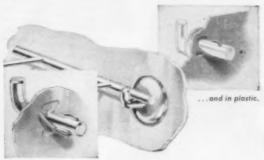


It's a Blind Rivet

...Or a removable fastener. It locks and unlocks with a 90° clockwise rotation. No mating parts such as nuts or receptacles are required.

It's a Shelf Support

... For ranges or refrigerators-in plastic and metal. Leading appliance makers have achieved substantial installation savings through its use.



Both in metal ...



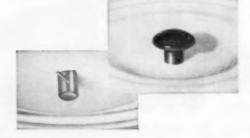


It's a Cabinet Door Strike

... Simple to install; eliminates welding and cuts assembly cost. Any head can be designed without affecting fastening principle.

It's a Lifter Knob or Dashboard Plug

... Plastic Spring-Lock heads are molded around steel inserts, giving strength at point of load or impact. Any shape head can be molded in any color.



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... Tell us how you can use Spring-Lock Fasteners in your products. We'll be glad to work out the details with you.

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QUICK-LOCK

SPRING-LOCK ROTO-LOCK LINK-LOCK DUAL-LOCK

NEW 36 PAGE CATALOG WITH APPLICATIONS SEND FOR IT



The arrow is pointing to the Du Pont test car's fuel-injection pump, which is driven by the same shaft as the distributor.



From these tanks in the trunk, any of six different fuels can be selected for testing in the fuel-injection engine.



Fuel-injection car being tested on DuPont Petroleum Laboratory's chassis dynamometer.

Special DuPont test car studies advantages of fuel-injection

Will fuel-injection soon replace our standard carburetor system? As yet, no one knows the answer! But there are certainly many advantages to recommend it . . . such as freedom from carburetor icing, reduction of vapor lock troubles and improved power. And it will permit automobile styling changes since the hood lines can be lowered.

But how would a trend to fuel-injection engines affect the refiner? As a large supplier of the chemical additives used to improve fuel performance, we at Du Pont are interested in this development. And to study it thoroughly, the Du Pont Petroleum Laboratory is using a specially equipped test car.

The car has a Lincoln V-8 engine

to which has been added an American Bosch fuel-injection system and special instrumentation. In addition to road work, the Petroleum Laboratory has tested the car on the Laboratory's chassis dynamometer.

From testing it with a variety of gasoline blends, the Laboratory has found that fuel-injection permits greater flexibility in blending fuels. Fuel components with higher vapor pressures can be used, and it is possible that increases in the use of higher end point fuels may be practical. These wider tolerances could result in signif-

icant economic advantages to refiners, as well as welcome benefits to the motoring public.

The Du Pont Petroleum Chemicals Division now has this car on a demonstration tour throughout the United



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Petroleum Chemica

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Mills, Drills, Bores, Turns Differential Gear Carriers

Another Transfer-matic by Cross

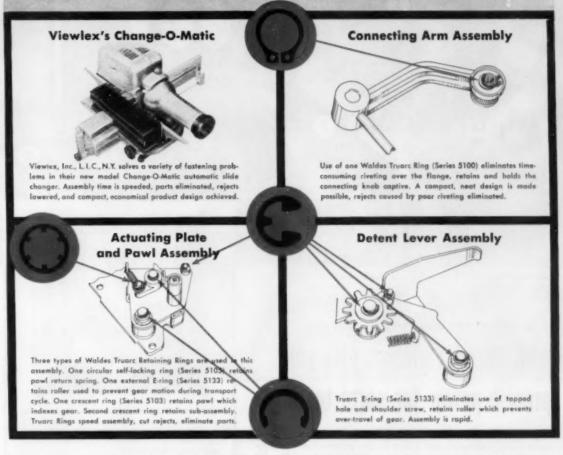
- * Rough and semi-finish bores pinion bores and cross bores; rough and finish faces and turns pilot diameter of torque tube flange; mills faces of cross bore bosses; spotfaces flange mounting holes; drills, chamfers, reams and taps all other holes except flange holes.
- * 115 pieces per hour at 100% efficiency.
- * 73 operations: 8 milling, 8 boring, 2 crossfacing, 1 turning, 18 drilling, 10 spotfacing, 7 chamfering, 2 reaming, 9 tapping, 8 probing.
- Complete interchangeability of all standard and special parts for easy maintenance.
- * Palletized work holding fixtures with hydraulically operated torque wrenches for clamping and unclamping parts.
- * Washing and drying unit for cleaning fixtures between last cutting station and loading station.
- * Other features: Construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; automatic lubrication system.

Established 1898

THE CROSS CO

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Waldes Truarc Rings Permit Better and More Economical Design—Fewer Parts, Faster Assembly, Minimal Rejects!



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within a type...5 metal specifications and 14 different finishes. Truarc rings are available from 90 stocking points throughout the U. S. A. and Canada.

More than 30 engineering-minded factory representatives and 700 field men are available to you on call. Send us your blueprints today...let our Truarc engineers help you solve design, assembly and production problems...without obligation.

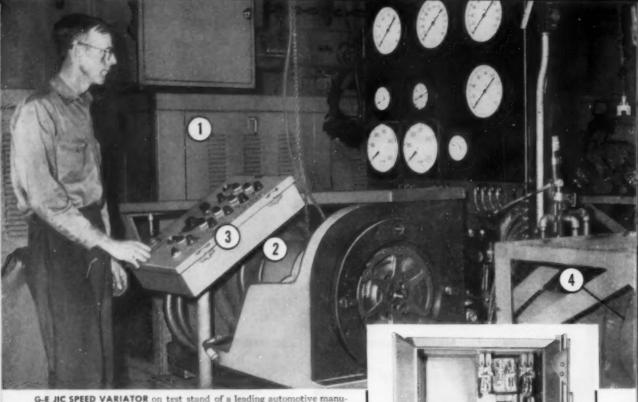
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WALDES TRUMPC Retaining Rings, Grooving Tools, Piers, Applicators and Dispensers are protected by one or more of the following U. S. Patents: 2,382,968; 2,411,426; 2,411,612; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,380; 2,483,380; 2,487,802; 2,487,803; 2,487,802; 2,487,803; 2



G-E JIC SPEED VARIATOR on test stand of a leading automotive manufacturer. Compact power unit (1) in background, drive motor (2) underneath operator's control (3) and inductor dynomometer (4) lower right.

G-E product-engineering reports . . .

JIC Speed Variators give you precise power for parts testing

General Electric packaged JIC Speed Variators used to drive machine tools, conveyors and hoists in the automotive industry are also building a reputation for use in automotive component testing.

WIDE SPEED RANGES, precise speed regulation, speed of response, low maintenance and easy installation features of this "packaged" drive are ideal for driving transmissions, axles, differentials, etc., on test stands. Its extreme versatility helps you keep pace with new, higher-speed component developments.

IN TYPICAL TEST SYSTEM above, Speed Variators supply 30 hp continuously at 2000 to 5000 rpm under close regulation to a transmission. Output is measured, with or without load, by a G-E inductor dynamometer. The precise power and accurate measurement of G-E Speed Variators and Dynamometers allow you to simulate most road conditions and obtain accurate readings.

YOUR G-E SALE REPRESENTATIVE has complete information. Contact him at your nearby G-E Apparatus Sales office or write for a copy of GEA-6000, JIC Speed Variators. Section 815-4, Direct Current Motor and Generator Department, General Electric Company, Erie, Pa.

GENERAL (28) ELECTRIC



COMPACT POWER UNIT contains m-g set and all control. Needs no special foundation for installation and includes such JIC features as interlocked doors, positive ventilation system, and color-coded wiring.



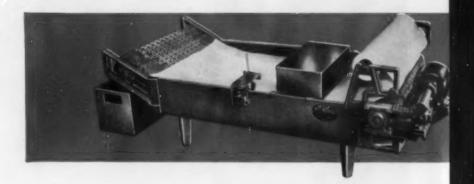
DC DRIVE MOTOR, of rugged, totally enclosed construction, provides better protection against dirt, dust and contaminants.

OPERATOR'S CONTROL includes push-buttons and rheostat in NEMA 12 enclosure or components may be integrated with master control panel.



Delpark FILTERS...

Major Choice AT THE MACHINE TOOL SHOW*



* Principal Manufacturers Exhibiting at the Machine Tool Show Chose Delpark Filters for Their Equipment

Delpark

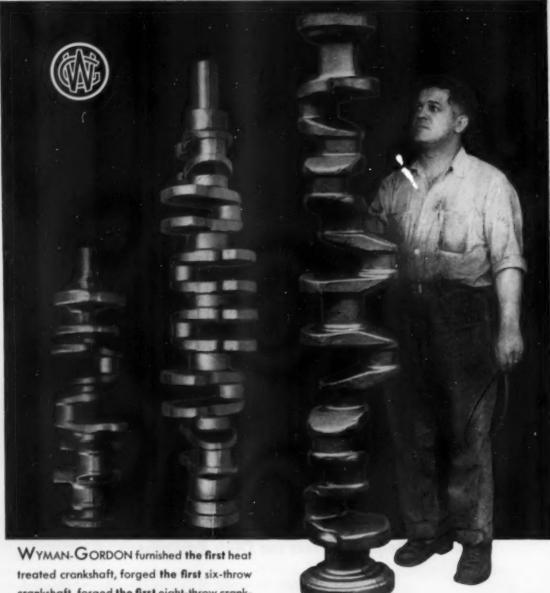
INDUSTRIAL FILTRATION

Backed by more than 40 years experience in industrial filtration

Did you note the number of Delpark Filters shown with grinding machines at the Machine Tool Show?

The reason is obvious. When engineers of grinding machines specify Delpark Filters, they assure their equipment of the finest in coolant filtration permitting the greatest machine accuracy and efficiency.

When builders know and specify Delpark Filters . . . you too can assure yourself . . . it's the finest.



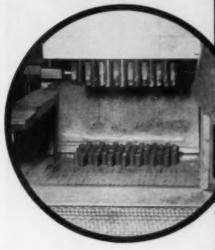
WYMAN-GORDON furnished the first heat treated crankshaft, forged the first six-throw crankshaft, forged the first eight-throw crankshaft, forged the first crankshaft with integral counterweights, and today forges a larger quantity and a greater variety of crankshafts than any other company in the world.

In a crankshaft there is no substitute for a forging, and in a forging there is no substitute for Wyman-Gordon quality and experience.

Crankshaft forgings illustrated, left to right, for V-8 passenger car, diesel truck and heavy tractor engines



Compacts 40,000 tablets an hour



... automatically

with **DENISON** MULTIPRESS

> an idea that simplifies many compaction jobs ... to save you money

52 TABLETS PER CYCLE coming off multiple-cavity die

52 tablets compacted with every ram cycle add up to 40,000 tablets. Tablets come down chuse, are collected and coated. an hour. That's what's turned out on a Denison hydraulic Multipress at this leading pharmaceutical company.

The entire operation is automatic. Results are uniform, cost is low.

Hoppers feed powder to a Denison Shuttle Feed Accessory that loads a multiple-cavity die. Two rapid, precision pressure controlled strokes of the Multipress ram compact the powder into tablets.

Many operations of compacting powdered materials can now be done faster, simpler . . . at substantial reductions in cost with Denison hydraulic Multipress and accessory equipment. Have a Denison Engineer study your operations and demonstrate how. Write.

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Why "Do It Yourself"?





Standard MALLORY

Electrodes Cost Less, Weld Better

Makeshift, "home made" welding electrodes can cost more than you realize. Not only do they take a lot of time to contrive, but they seldom have the strength, conductivity and cooling facilities to give good welds and satisfactory life.

Before you "do it yourself," take a look at what Mallory has to offer, in the way of unusual electrode shapes. Literally hundreds of single and double bend electrodes that you may consider special are standard Mallory designs . . . which we can make promptly and economically using existing tool facilities.

Exclusive Mallory cold-forming techniques shape these bent electrodes

*Patent Number 2489993

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Serving Industry with These Products:

Electromechanical—Resistors + Switches + Television Tuners + Vibrators
Electrochemical—Capacitors + Rectifiers + Mercury Batteries
Metallurgical—Contacts + Special Metals and Ceramics + Welding Materials

from full hard rod stock, and develop high hardness and strength far beyond what can be obtained by conventional hot forging methods. Cooling tubes may be bent in place* by a special process, to provide water flow as near to the welding face as in the case of straight electrodes. These extra values designed into Mallory electrodes assure you of long life, long runs between dressings... more welds per dollar.

For information on available designs, ask your local Mallory Welding Distributor for a copy of the latest Mallory Welding Catalog, or write directly to us.

Expect more . . . Get more from



Per information on titanium developments, contact Mallary-Sharon Titanium Corp., Nilos, Ohio

FOR PRECISION THREADS

Finer than the human eye can count

(Illustrations enlarged 2% times)

WITH THE DBS Style VERS-O-TOOL, exacting instrument screw threads as fine as .045"-90 N.S. are cut consistently to Class 3 specifications, with a well-formed included angle.

IF YOU CUT THREADS, TURN, OR FORM FROM THE END — Namco VERS-O-TOOL System gives you

This standard VERS-O-TOOL head cuts 'em by the thousands—exactly to specifications

Each threading job, whether it's tiny precision instrument parts. or huge oil field pipe lines, has its own special requirements. Maybe it's machinability, thread form or size . . . or it may be tolerances or fussy finishes.

In supplying and servicing National Acme Vers-o-tool heads for thousands of such threading jobs, our engineers have become familiar with all those requirements.

And it's a pretty good bet that in so doing, they have accumulated the experience which will give you the most accurate threads, with the least trouble and at the lowest cost per piece.

You name the job. Vers-o-tool has the cost-cutting answer.

SEND FOR BULLETIN DT-52. Or, better yet, ask for our recommendations.

It's this simple -

Take a standard Vers-o-tool (the self-opening die head—you don't have to back it off the threads).

greater cost-reducing flexibility.

- For threading, use National Acme ground thread chasers (for greatest economy use the circular type for long runs; the ad-justable blade type for short runs).
- Convert to any other end turning or forming operation by changing only the cutters and blocks.
- Use Namco micrometer gage to check and set chasers or cutters during resharpen-ing. No time-wasting trial cuts required.
- Standard Vers-o-tools are made in revolving Style DR and non-revolving Style DS for diameters .056" to 6\%"; Style DBS for BSA and Brown & Sharpe automatics.









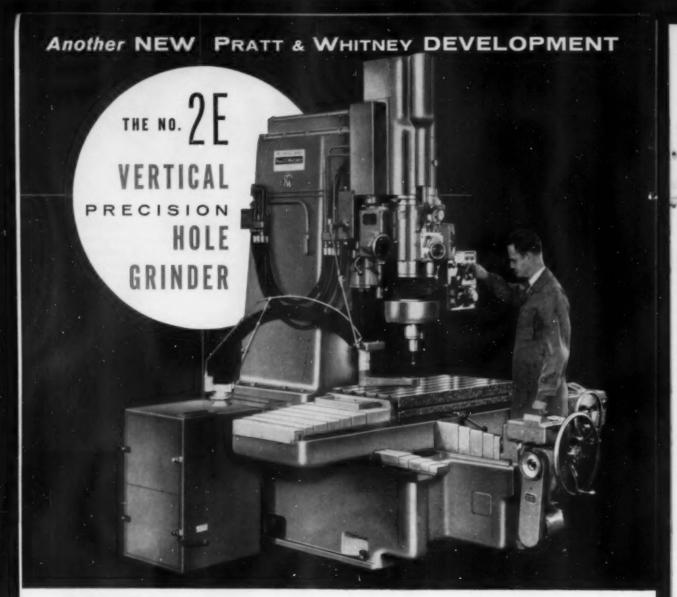
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THE NATIONAL ACME COMPANY

173 EAST 131st STREET . CLEVELAND 8, OHIO



EXTREMELY ACCURATE . . . Incorporates the famous P & W
Electrolimit Measuring System. Table settings accurate to
.0001". Grinds straight or tapered holes and radii with
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 HIGH GRINDING SPEEDS... Preumatic grinding heads, of unique air bearing design, provide speeds from 4,000 to 100,000 rpm. Governor effectively maintains speed settings regardless of load changes.

FAST, SIMPLE, ECONOMICAL OPERATION... Unlike conventional bore grinders, the 2E holds work stationary; grinding head has planetary motion around axis of hole. This — com-

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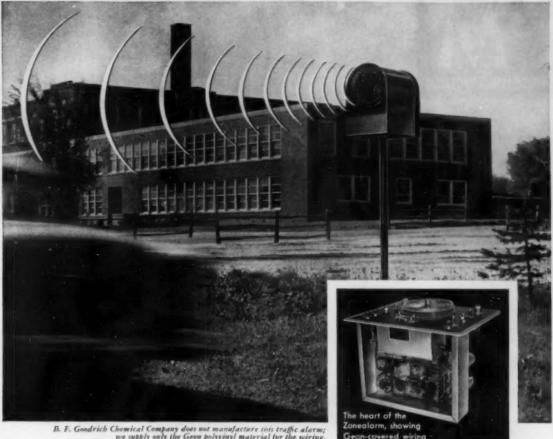
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Another new development using

B. F. Goodrich Chemical raw materials



B. F. Goodrich Chemical Company does not manufacture this traffic alarm; we supply only the Geon polyvinyl material for the wiring.

It Hoots at school speeders

DRIVERS who ignore signs call-ing for reduced speeds in school zones are in for a surprise when they meet up with Zonealarm.

It looks as innocent as a rural mailbox, but inside there is an ingenious maze of electronic devices and Geon insulated wiring that add up to trouble for speeders. If the driver ignores a warning sign, Zonealarm gives out with an ear-splitting howl. Police will tell you that where it is installed everybody slows down.

Zonealarm is a permanent installa-

tion and the mechanism must stand up in all kinds of weather and this calls for cable insulated with Geon. The remarkable dielectric strength of Geon polyvinyl materials, plus their outstanding resistance to abrasion, chemicals, and extremes of temperature, make them favored throughout industry.

Geon is used for colorful, decorative upholstery, for resilient sponge, waterproof coatings, corrosion-proof pipe, and a myriad of other products. To see how it can improve one of your

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In Rolls • FIRST Dry Process Brake Lining • FIRST Molded Asbesto: Clutch Facings for Clutches Operating in Oil

Lining • FIRST Woven Clutch Facings • FIRST Molded Asbesto: Clutch Facings for Clutches Operating in Oil FIRST IN FRICTION FIRST Endless Woven Clutch Facings • FIRST Pre-Treated Clutch Facings • FIRST Bonded-to-Metal Clutch Facings

THE PACE IN FRICTION MATERIAL DEVELOPMENT



BONDING

The bonding of friction materials to other mating members is an art. Raybestos-Manhattan, for fifty years the world's largest maker of friction materials, has spent a longer time than any other company acquiring proficiency in it. Each successive job we've tackled has added to our knowledge of friction materials behavior, metals handling, heating cycles, adhesive selection, and the like. Consequently, we offer you bonding know-how and experience second to none.

Trouble-shooting field trips—hundreds and hundreds of them—have familiarized R/M engineers with countless bonding problems. So the chances are that if one is confronting you, R/M has already solved it. Example: a manufacturer could not bond R/M-furnished, semi-metallic strips to his automatic transmission bands without developing blisters. R/M engineers found that gas generated by the adhesive was causing the trouble. Our engineers recognized the condition as one they had encountered in bonding other materials. By installing a breather—a momentary release of pressure in the bonding cycle—they eliminated the problem.

R/M can bond to almost any type material. Steel is the mating member most frequently used. But R/M can also bond to aluminum, phosphor bronze, and fibrous materials.

R/M is at home in both the asbestos and metal fields, working with all friction materials. You are assured of unbiased advice on these materials when you consult an R/M engineer. Our contributions to today's automatic transmissions prove the point. Every model of full or semi-automatic transmission for passenger cars (many trucks, too) is equipped with one or more R/M friction products—sintered metal, semi-metallic, woven, molded, or cork-cellulose.

If you are working with friction materials, we suggest that you call in an R/M representative. It will pay you to take full advantage of our experience and the facilities of our seven plants, with their research and testing laboratories.

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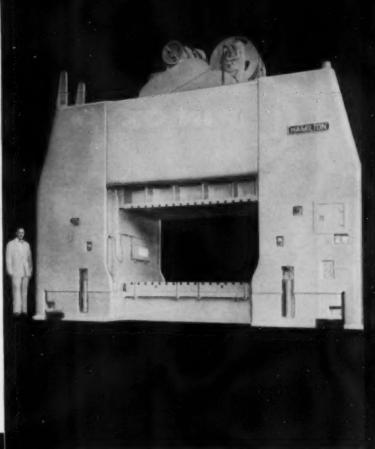
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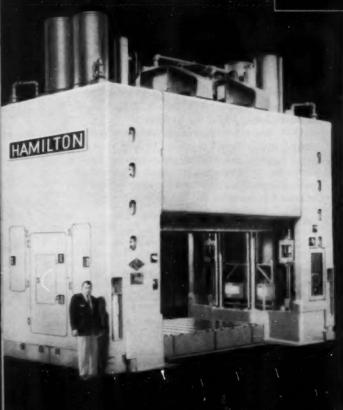
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This informative color booklet includes cut-away of the KGA51 Truck—shows why this is the smoothest handling lift truck ever built. Welte: The

Yalo & Towne Manufacturing Company, Roosevelt Boulevard, Philadelphia 15, Pa., Dept. 711.

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INDUSTRIAL LIFT
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set them, forget them-they stay tight

Up to 40% higher tightening torque—
tightening torque—
a new Unbrako feature

RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)

(inch-rounds)			MINIMUM	
SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW	DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

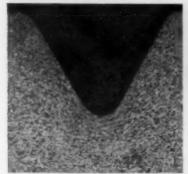
All Unbrakes can withstand higher tightening torques than ordinary set screws. For example, the recommended torque for a ½" Unbrake is 87 inch-pounds—40% greater than that recommended for an ordinary set screw.

Research has proved that the tighter you seat a set screw the better it works. We went to work to design a socket set screw that could be tightened tighter than ever before without damaging the screw.



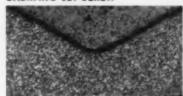
We formed a deeper socket. We put a radius in the socket corners. We developed fully formed threads. We established new methods of heat treatment in atmosphere-controlled furnaces. It took almost 6 years' research and development, but the new High-Torque UNBRAKO incorporates all of these improvements. And it retains the selflocking knurled cup point that keeps an UNBRAKO tight up to 48 times as long as a plain cup point set screw, regardless of the size of the point or the cup.

UNBRAKO SET SCREW



We fully form the threads - make the whole screw stronger. The metal is compressed into the closely knit grain structure that you see in this illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. The Unbrako retains its flow lines even when ground down to .010" below root diameter. Screws with cut or ground threads lose thread form at root diameter.

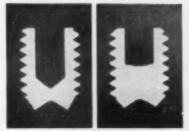
UNBRAKO SET SCREW



We put a radius in the socket corners eliminate the sharp corners where cracks start. This distributes the stresses developed when tightening torques are applied. Ordinary socket screws have sharp corners which often crack when tightened even at lower recommended torques.

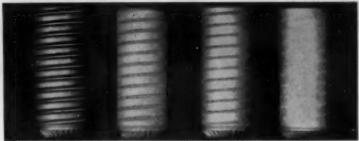
UNBRAKO SET SCREW

ORDINARY SET SCREW



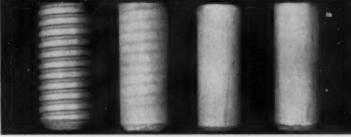
We form a deeper socket-give you more purchase with the wrench. Since more wrench can be put into the UNBRAKO socket, you can set the screw much tighter. And you won't ream the socket or round the corners of the wrench.

UNBRAKO SET SCREW



.010" below

ORDINARY SET SCREW



Pitch diameter

Root diameter

.010" below

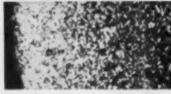
UNBRAKO SET SCREW





ORDINARY SET SCREW





We heat treat an UNBRANG properly. It's a ticklish job to heat treat a socket set screw. If you don't do it just right, you get decarburization. And decarb plays havoc with a screw. Put a wrench in the socket and you ream it. Run the screw into a tapped hole and you strip its threads. Try to seat the screw and its point shears off. These photos show the good and the bad. The Unbrako is clean. Its grain structure is uniform. There is no decarburization-the ordinary screw is suffering from an overdose of it, socket walls, threads and point are full of the telltale white spots.

You can't buy a better set screw than an UMRAKO. See your authorized industrial distributor today. Or write STANDARD PRESSED STEEL Co., Jenkintown 53, Pa.

STANDARD PRESSED STEEL CO.





JENKINTOWN, PENNSYLVANIA

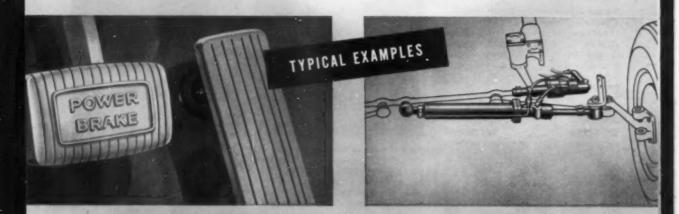


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High Spots of This Issue

1956 Car Models Contain Many Innovations

Described are the new Packard (page 48), Buick (page 50), Chevrolet (page 56), and Clipper (page 68). Also the Oldsmobile (page 71), Pontiac (page 96), Plymouth (page 98), and Cadillac (page 100).

New Hydra-Matic Drive Has Two Fluid Couplings

Providing greater smoothness, the advanced version of this well-known automatic transmission makes its first appearance on 1956 cars. The article includes diagrams showing the fluid flow in various speeds. Page 62.

Automatic Transmission Gears Held to Close Tolerances

High precision is attained in the manufacture of Ford-O-Matic gears at Borg-Warner's new Decatur, Illinois, plant. The procedures and methods for accomplishing this are discussed. Page 52.

Frankfort Show Reveals Growth of German Industry

The 37th German Automobile show, held after a lapse of $2\frac{1}{2}$ years, revealed a fast-growing industry. Illustrated and described are the various new offerings of this manufacturing group. Page 58.

*Automatic Balancing of Transmission Parts

A new concept in balancing techniques, permitting complete automatic balancing of a variety of parts, is illustrated by its application to the handling of parts for the 1956 Hydra-Matic. Page 70.

39 New Product Items
And Other High Spots, Such As:

Automatic machining of engine valves; machinery news; automation news report; new plant and production equipment; and Metals Market.

Complete Table of Contents, Page 3 Automobile and Aviation News, Page 33

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT ENGINEERING • MANAGEMENT

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Automatic milling, using a simple oneway feed cycle on a New Cincinnati Plain Dial Type Milling Machine with Automatic Table Cycles



The New CINCINNATI No. 3 Vertical Dial Type Milling Machine

STOP

Automatic Table Cycles save money for you on the big quantity jobs.

Ask anyone who was there. The four new CINCINNATI Dial Type Milling Machines were a big attraction at the recent Machine Tool Show. And the new Dial Types are bound to make a bigger hit in your shop . . . with the operator and foreman . . . with the methods engineer . . . with the new equipment analyst.

THE NEW DIAL TYPES are easier and safer than
ever before to operate because of their dual
push-button controls; complete safety from
spinning hand cranks; large and conveniently
located speed and feed dials.

THE NEW DIAL TYPES have the capacity to take on more work than ever before . . . higher ranges of speeds and feeds (up to 90" per minute feed rate); more than 50% increase in power; fully automatic table feed cycles if you want it; automatic backlash eliminator standard equipment.



THE NEW DIAL TYPES will satisfy the most critical equipment analyst . . . built-in, completely protected electrical controls; feed drive motor, unit construction and cradle type mounting of main drive motor reduce maintenance expense; operators can utilize their energy more productively; big variety of work, including high production jobs, can be assigned to the New Dial Types.

Everywhere you look you'll find new Dial Type features of value in your shop. There are many, many more than outlined here. You will get a better idea from the new catalog. Write for your copy of publication No. M-1915.

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Zews of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 113, No. 9

November 1, 1955

Pontiac To Push Sales Of Hardtops Next Year

Pontiac is shooting for a record production of 700,000 cars during 1956 with which it hopes to win at least nine per cent of the total industry market. The GM division is counting heavily on hardtop models to help it achieve that record, and will devote over two-thirds of its output to the pillarless models next year.

Pontiac ended its 1955 model run with record sales and production of 554,091 cars, 93 per cent higher than last year. It is looking forward to about a 20 per cent increase again next year.

Although Pontiac's standing in the industry remained unchanged, the division's share of the total market rose one per cent from 6½ to 7½ per cent. Latest registration figures show Pontiac in sixth place, the same spot it held last year.

A major factor in the division's prediction for higher sales next year is the introduction this year of four-door and two-door Catalina hardtop models in all three series. Pontiac predicts that the pillarless models in the lower priced 860 series alone should add about 100,000 sales next year.

GM Earmarks \$4.5 Million For Expansion In France

Continued confidence in the European market is indicated by General Motors Corp., which last month revealed that it will spend another \$4.5 million on expansion in France. Biggest portion of the expenditure will go for new buildings and equipment for the company's Frigidaire operation in Gennevilliers, where floor space will be expanded by about 200,000 sq ft.

AC-Delco operations, also housed there, will share in the expansion of manufacturing, assembly, storage, and



Saft top model of 1956 Thunderbird has larger rear window with sipper.

other facilities. Part of GM's \$200 million European program, the expansion brings to \$8 million the amount to be expended at General Motors of France during the next three years.

Three Engine Choices Offered In Ford Thunderbird for 1956

Three power plant options are offered on the Ford Thunderbird car for 1956. The most powerful is a 312 cu in. Thunderbird special Y-8 rated at 225 hp with Fordamatic transmission and a 9 to 1 compression ratio. Secondly, there is a 312 cu in. engine rated at 215 hp with overdrive and a compression ratio of 8.4 to 1. The third engine is a 292 cu in. unit rated at 202 hp with a 8.4 to 1 compression ratio and standard transmission.

All safety features on the 1956 Ford line are available on the 1956 Thunderbird. A new ventilation system has cowl vents above the floor on each side of the car. Also, new flipper windows on each side of the car help to regulate the flow of fresh air into the car.

An alternate hardtop with a port hole on each side is available as an option in place of the regular hardtop. On the soft top model there is a larger rear window equipped with a sipper so that it may be rolled down to allow full air passage.

A combination tonneau and convertible storage compartment cover is available as an option. The color matches the interior bolster. A zipper down the middle runs the full length of the cover, so that the car may be operated with the passenger side protected by the tonneau cover.

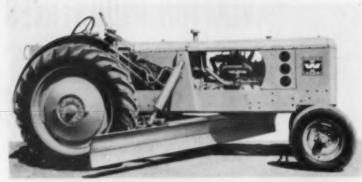
Ride and handling have been improved by new shock absorbers, longer rear springs, and increased steering ratio of 23 to 1. A 12-volt electrical system is standard on the 1956 Thunderbird.

Studebaker-Packard Official Is Appointed to AEC Post

Harold S. Vance, chairman of the executive committee of Studebaker-Packard Corp., has been named to the Atomic Energy Commission by President Eisenhower. Mr. Vance will serve a term expiring June 30, 1960.

The AEC job, still subject to Senate confirmation, pays \$18,000 a year. The S-P executive has served as a special consultant to the Director of the Office of Defense Mobilization without pay since 1953.

Trews of the AUTOMOTIVE



MAINTAINER WITH HYDRAULIC TORQUE CONVERTER

Improved Huber-Warca Maintainer features new hydraulic torque converter and power stiding moldboard as standard equipment. Either gesoline or Diesel power is available—a Continental F-162, 45½-hp gasoline engine or a Continental GD-157, 40-hp Diesel engine. Five speeds range from 1.7 to 21 mph.

Luxury Continental Car Carries \$8800 Price Tag

Ford Motor Co. has revealed that the list price of the new Continental Mark II will be \$8800. Actual price the customer will have to pay, however, will be close to \$10,000, after various taxes and other charges are tagged on.

Air conditioning will be the only item offered as an extra-cost option. All other equipment, generally offered at extra cost, will be standard on the Continental.

2.5 Million Vehicles Chevrolet's '56 Goal

Chevrolet hopes to end up the year with a record production of 2.2 million cars and trucks in the U. S. and is setting its eights on 2.5 million units for 1956, about 10 per cent higher than this year. After that, it will aim for a three-million-a-year car and truck volume.

To achieve the aforementioned goal, the GM division plans to add more than 4.25 million aq ft of manufacturing and warehousing area, which is in addition to the 5.5 million aq ft expansion program announced last year by Chevrolet. Plants scheduled for further expansion include those in Atlanta, Baltimore, Flint, Mich., Janesville, Wis., Kansas City, Los Angeles, Norwood, O., St. Louis,

Cleveland, and Bay City and Willow Run, Mich., which will get about 2.57 million eq ft of new manufacturing area. In addition, four of those plants and one in Cincinnati will get another 1.6 million sq ft of new warehousing.

Chevrolet entered the last quarter of this year with an output of 1.7 million units, highest nine-month period on record. Production in the final quarter would have to total approximately 500,000 units to reach this year's goal of 2.2 million vehicles in the U. S. Output in Canada is expected to total an additional 90,000 vehicles, for a grand total of close to 2.3 million units.

GM Lifts Ban On Sale Of Its Cars to Russia

General Motors' decision to sell automobiles to Russia and its European satellites marks a major shift from the policy the corporation established in 1953. GM cut off trade with Russia as a result of the Korean conflict, although the U. S. Government has never banned such trade but governs it by export licensing.

The Government, however, has refused licenses to some U. S. manufacturers, particularly those in the agricultural fields. Other car makers, which also banned trade with Russia, are expected to start doing business again with the European countries.

Pontiac '56 Car Prices Increased \$88 to \$117

Pontiac is the first General Motors division to announce prices on 1956 cars. The new prices indicate that other GM divisions probably will go along with the rest of the industry with about a five per cent increase over comparable 1955 models.

Increases on Pontiac cars range from \$88 on the lower price Chieftain 860 Series to \$117 on the highest priced Star Chief line. Pontiac's new Strato-Flight Hydra-Matic transmission, first of the improved transmissions to be presented by GM for 1956, is priced at \$190, about \$12 above the regular Hydra-Matic transmission.

The new automatic transmission is available as an option on only the Star Chief line, which will include four-barrel carburetors as standard. Air conditioning has been reduced by \$150 to \$400, and directional signals now are standard on the entire line.

PONTIAC PRICES*

Chieftain 860 Series	1956	1955
Two-door Sedan	2,006 2,000	\$1,917 1,972
Catalina Coupe (two-door hardtop) Catalina Sedan (four-door	2,127	
hardtop) Two-door Station Wagon . Four-door Station Wagon	2,195 2,311 2,389	2,221
Chieftain 870 Series		
Four-door Sedan Catalina Coupe (two-door	2,167	2,069
hardtop)	2,229	2,13
hardtop) Four-door Station Wagon	2,279	2,38
Star Chief		
Four-door Sedan Convertible Custom Catalina Coupe		2,15
(two-door hardtop) Custom Catalina Sedan	2,401	2,28
(four-door hardtop) Custom Station Wagen	2,466 2,831	2,71

* Prices do not include Federal, state or local taxes, transportation or dealer handling charges.

Chrysler Engine Torque Data

Just at press time, torque figures for 1956 Chrysler Div. engines became available. Indicated torques for the respective engines are as follows: Windsor 225-hp engine—310 lb ft at 2400 rpm; Windsor 250-hp engine—340 lb ft at 2800 rpm; and Chrysler New Yorker and Imperial engine—380 lb ft at 2800 rpm.

AND AVIATION INDUSTRIES

Record Ford Profits Forecast; Millions Ventured for Future

Ford Motor Co. expects its profits in 1955 to be the highest in its 52-year history. This optimistic prediction was made by Henry Ford II, president of the company, during a press conference held in conjunction with a three-day gathering in Dearborn, Mich., last month (see AI, Oct. 15, p. 38).

In announcing the fact that Ford will spend \$500 million on plant expansion next year and a similar sum during the 1957-58 period, Mr. Ford also disclosed that by the end of 1955 the company will have invested \$1.65 billion in expansion since the end of WW II. This figure will rise to \$2.65 billion eventually under the new programs planned.

During the course of the affair, at which the new Ford Mystere experimental car was unveiled (see illustration), it was also revealed that the new Mahwah, N. J., assembly plant of Ford Div. will be placed on a two-shift production schedule in January. The move is part of the division's program to increase its production capacity by 250,000 units for 1956, Furthermore, the division has already expanded its station wagon capacity by 70 per cent.

\$700,000 Expansion Planned By Federal-Mogul In Mich.

A \$700,000 expansion to boost output at its Greenville, Mich., plant has been announced by Federal Mogul Co. The expansion will necessitate about a 10 per cent increase in employment. The Greenville plant makes automotive bearings.

Battelle Institute Developing New Car Headlighting System

Headlight glare reduction by a fundamentally different method is incorporated in an automobile headlighting system being developed at Battelle Institute. Instead of lowering and dimming headlights to reduce glare in the eyes of an approaching driver, the system is designed to cast a shadow over that portion of the road occupied by oncoming cars.



The Ford Mystere experimental styling car (see AI, Oct. 15, p. 38) has a height of only \$2 in. Its new styling features include sculptured rear fins, rear engine comparent, four headlights, hinged bubble type glass roof cancy, and front bumper pods.

It is expected that seeing distance with the new headlamp will be about 500 to 1000 ft, even while meeting and passing an approaching vehicle. When no car is approaching, the lights cover a normal width. When a car appears in the opposite lane, a photosensitive tube reacts to the light from the left headlight of the oncoming car.

As the car approaches, a vane moves in front of the photo tube to position itself in relation to the oncoming light. By electrical linkage, a corresponding vane in the headlight is positioned to cast a shadow over the approaching car. The shadow changes position as the cars approach.

Chrysler Hikes Prices for '56; Imperial Cars Up \$276 to \$300

Chrysler Div. has increased prices on its Windsor and New Yorker series of cars by from \$153 to \$248. Prices on the Imperial cars have been boosted \$274 on the four-door sedan and \$300 on the two-door Southampton hardtop.

Four-door hardtops are offered for the first time in the Windsor and New Yorker series, as well as in the Imperial cars. Prices on the Windsor series, ranging from \$2565 on the four-door sedan to \$3242 on the Town and Country Wagon, represent an increase of less than six per cent.

A 6.8 per cent average boost has been made on the New Yorker, with

prices ranging from \$3402 on the four-door sedan to \$4094 on the Town and Country Wagon. Prices on the Crown Imperial will be announced later.

CHRYSLER PRICES*

CHINI SEEN I NI		
Windsor Series	1966	1955
Four-door Sedan (hrdtp) Two-door Nassau (hrdtp) Two-door Newport (hrdtp) Four-door Newport (hrdtp) Convertible Coupe	2,597 2,724 2,805	\$2,412 2,452 2,559 2,812
Convertible Coupe	3,242	3,037
Four-door Sedan Two-door Newport (hrdtp) Two-door St. Regis (hrdtp) Four-door Newport (hrdtp)	3,562 3,563 3,603 3,702	3,185 3,332 3,367
Convertible Coupe Town and Country Wagon	3,833 4,024	3,886

IMPERIAL PRICES*

\$4,105		Four-door Sedan
4,325	mpton 4,625	Two-door Southa
	4,747	

* Factory retail prices, not including Federal, state or local taxes, or distribution and handling charges.

Goodyear To Up Output Of Chemigum and Resin

Goodyear Tire & Rubber Co. will spend \$3.5 million to increase capacity for production of Chemigum and resin. When the project is completed, output of nitrile rubbers and latices also will be increased substantially, as well as several other products. Scheduled for completion by August 1986, the project is part of the company's \$100 million expansion program.

Thews of the AUTOMOTIVE



EXECUTIVE AIRCRAFT POWERED BY TWIN ENGINES

Aero Design & Engineering Co. has announced the start of production for 1956 delivery of the new Model 680 Super Aero Commander executive plane. It is said to cruise at a speed of 230 mph at 10,000 ff at 70 per cent power. The craft is powered by twin supercharged Lycoming GSO-480-ATA engines, each developing 340 hp for take-off and a continuous normal rating of 320 hp.

Car Sales Continue To Topple Records

Record-shattering automobile sales were continuing through September, according to latest figures available. This took place despite a slack in production due to model changeovers.

Indications are that sales will continue strongly through the end of the year, with the 1955 total estimated at a record 7.5 million units. For example, sales of 363,473 units in September, one of the company's best months in history, brought General Motors' new car sales for the first nine months of this year to a record 3,792,132 cars for that period.

Indication of the high sales at Chrysler Corp. is the report from the Chrysler Div., which shows dealers sold 132,143 cars between Jan. 1 and Sept. 30, 1955. The total was nearly 81 per cent above the same period last year, when the division sold 73,083 cars.

Willys Sales Show Rise Of 37 Per Cent Over '54

Kaiser Motors' big sales push on its utility commercial vehicles is reflected in a sales report from Willys Motors. Sales for the first nine months of this year were 37 per cent better than in the comparable period of 1954. Despite a supplier strike, which halted Willys' production for one week, September sales hit a record. They climbed more than 21 per cent above the monthly average of the previous eight months.

The company continues to accelerate its merchandising program in strategic market areas, and to expand its dealer organization for the utility vehicles. The company has signed up about 500 new dealers in the last six months.

De Soto Price Boosts Average 5.6 Per Cent

Frices announced for the 1956 De Soto line of cars indicate an average increase of 5.6 per cent over comparable 1955 models. Boosts range from \$125 on the Firedome four-door sedan to \$197 on the Firedome convertible.

There are few price differences in accessories for 1956. An exception is power steering, which has been reduced from \$105 to \$90.

Three new models have been added to De Soto's 1956 lineup, including four-door hardtops in each of the series, for a total of 11 models. The Special Coupe offered in the Firedome series in 1955 has been renamed the Seville hardtop. Automatic transmission, priced at \$175 and offered as optional equipment in 1955, is now standard on the Fireflite series.

DE SOTO PRICES*

DE SOIO PRICES"	
Firedome S-23 Series 1956	1965
Four-door Sedan \$2,393 Two-door Seville 2,445 Two-door Sportsman 2,557 Four-door Seville 2,337 Four-door Sportsman 2,449 Convertible 2,788 Station Wagon (six-pase) 3,037	\$2,268 2,398 3,413 2,571 2,893
Fireflite S-24 Series	
Four-door Sedan	2,481 2,678 2,875

* Factory retail prices at Detroit, Mich., excluding local or excise taxes, transportation, handling, and conditioning charges. Prices include automatic transmission on Firefilite series.

Union Exerting Pressure Toward Shorter Work Week

The pressure is on in the UAW-CIO's efforts toward a shorter work week and earlier retirement. Union president Walter Reuther has already started to build up a "case," which probably will be presented to automobile companies when contract talks open again in 1958.

Whether Reuther will win his case in 1958 is anybody's guess at present. The CIO president is said to have high hopes, however, that a four-day work week will become a reality by 1965. The growing trend toward automation will certainly serve as a basis for his arguments toward winning the goal.

Appearing before a Congressional subcommittee recently, Reuther said automation rapidly is bringing industrial changes which can produce great national abundance "if managed rightly." He urged the committee to support a spread-the-work program and proposed a gradual shift toward a 30-to-35-hour week, retirement at 60, low interest rates, and anti-trust enforcement to help small business.

Stockholders Approve Name Alteration for Hayes Mfg.

Stockholders have approved changing the name of Hayes Manufacturing Corp. to United Industrial Corp. Head-quartered in Grand Rapids, Mich., the company has subsidiaries and affiliates in Monroe, Philadelphia, Birmingham, Ala., and Cockeysville, Md., in addition to two Canadian subsidiaries of the concern.

AND AVIATION INDUSTRIES



JET ENGINE STARTER

Shown here is a new type of jet engine starter which takes its power directly from a gasoline engine through a hydraulic torque converter. Designed and put into service by North American Aviation, Inc., the small starter can tow planes to the take-off position as well. Equipped with a four-wheel drive and four-wheel steering, it can provide 28-voft, d-c power for the plane itself

Expansion Program Nears Completion At Scintilla

New facilities for the Scintilla Div. of Bendix Aviation Corp. are expected to be completed by the end of the year. Consisting of a 25,000 sq ft engineering building and a 5000 sq ft unit to house tumbling equipment and a paint shop, the buildings are part of a \$10 million expansion program launched by Bendix earlier this year. The new facilities, costing about \$2 million, will give the Scintilla plant in Sidney, N. Y., a total of 550,000 sq ft of space.

Three More Plants Included In Delco-Remy Expansions

Delco-Remy Div. of General Motors Corp. is planning to expand several more plants to increase production of batteries by about 30 per cent. The expansion, part of GM's \$500 million capital expenditures program, will involve plants in Muncie, Ind., New Brunswick, N. J., and Anaheim, Calif.

Completion of the program is planned for the middle of 1956. Delco replacement sales are currently running about 32 per cent ahead of 1954.

TABLOID

Goodyear Tire & Rubber Co. plans to spend \$7.5 million on modernization and expansion at its Los Angeles, Calif., plant.

Dana Corp. has announced the production of a new two-stage clutch originally designed for use on the Fergusen 35 tractor. . . . Firestone Tire & Rubber Co. has developed a new silent-running tubeless snow and ice tire.

Pittsburgh Plate Glass Co. has disclosed plans for the construction of a multi-million dollar window glass producing plant at Decatur, Ill. . . Etna Machine Co. is erecting a new \$300,000 plant near Perrysburg, O.

Hughes Aircraft Co. currently has a \$313 million backlog with annual sales of about \$200 million.

Detroit Reamer & Tool Co. has moved into its new plant and offices at 780 West Maple Rd., Birmingham, Mich. . . Society of Motor Manufacturers & Traders, Ltd., has moved its office to 17 East 54th St., New York 22, N. Y.

Aluminum Co. of America is now offering a complete line of color anodized aluminum sheet, tube, extruded shapes, and fasteners.

.

John Deere has added a new fiveplow standard-trend Model "80" Diesel unit to its tractor line. . . . Allis-Chalmers Mfg. Co. has added a new hydraulically operated TW-360 bottom dump motor wagon to its line of earthmoving and construction machinery.

Pioneer Engineering & Mfg. Co. has formed a new division devoted to body engineering. Sperry Gyroscope Co., Ltd., has been established as an overseas manufacturing source for Vickers aircraft hydraulic systems.

Mack Trucks, Inc., has announced development of 25 new truck models designed especially for users in the Western states.

Directors of Consolidated Engineering Corp. have approved a change of the company's name to Consolidated Electrodynamics Corp.

Square D Co. has formed an English subsidiary to manufacture and market its electrical distribution and control products in the British Isles and Europe.

4 4

American Brake Shoe Co. forecasts a 28 per cent increase in its sales this year and a 35 per cent increase in earnings before taxes.

Fairchild Engine & Airplane Corp. has announced that its Aircraft Div. has leased plant facilities of the Jonco Aircraft Corp. at Shawnee, Okla.

Minneapolis-Moline Co. has announced plans to close and sell its farm implement plant at Louisville, Ky.

Aerobilt Bodies, Inc., subsidiary of Grumman Aircraft Engineering Corp., has opened a new \$350,000 plant in West Athens, N. Y. It will manufacture Grumman motor truck and trailer bodies.

Berliss Bearing Co. has moved its plant and offices to 644 W. Mt. Pleasant Ave., Livingston, N. J. . . Supresite Corp. has moved to 300 Seymour Ave., Derby, Conn.

(Turn to page 138, please)

Mews of the AUTOMOTIVE

AUGUST SCORES AS BANNER, MONTH FOR SEVERAL MAKES

1955 New Passenger Car Registrations*

Arranged by Makes in Descending Order According to the 1955 Eight Months' Totals

					EIGHT M	IONTHS	
	Amount	Books	Assessed	Un	nits	Per Cent	of Total
MAKE	1986	1965	1984	1965	1964	1956	1954
Chevrolet	151,646	190,077	FFQ.613	1,066,362	928,000	21.93	24.88
Ford.	149,749	143,197	109,408	1.032.046	925,878	21.42	24.81
Buick	70.751	64,833	45,549	515,742	352,180	10.71	9.44
Plymouth	57,280	56.645	27,172	450.200	281,391	9.53	7.54
Oldemobilio	64.282	52,360	37.665	387.375	273,216	8.25	7.32
Posting	47.210	47,330	27,296	359,805	235,905	7.47	6.32
Marcory	24,661	35, 114	21,082	248,064	198,428	5.15	5.32
Dedge	23.738	23 616	11,202	193,233	102,080	4.01	2.74
Chrysier	12.636	13.500	6,435	111,370	66 666	2.31	1.07
Comilina	12.620	10.820	9.755	97,343	73.715	2 82	1.00
De Seto	9 379	10 005	5 440	83,421	52,044	1.73	1.30
Studebeker	7 210	0.005	7 901	09,523	64,332	1.44	1.72
Modh	9 300	9.821	A 205	66 354	57,997	1.00	1 56
Package	4 362	4 910	2 900	36,039	20 340	75	7.30
Madeon	A 041	4 354	2 800	31,979	24 340	- 70	-76
Lincoln	9. 230	3,225	2 747	21,414	25.583	44	. 90
Million	414	400	1,757	5.237			.00
Majoor	74	41	1,737	9.237	13,136	.44 .11 .02	.76 .65 .08 .35 .17
Miss. Dissertie	20	41	877	854	0,430	.02	.17
Foreign	22 200	4 700	200	240	2,704	.01	.07
Foreign	0,000	4,000	2,234	31,647	16,000	.66	.43

Total All Makes 888,984 \$47,245
* Based on data from R. L. Polk & Co.

Bendix Radio Strike Points Up Size of Shutdown Losses

440.312

The heavy costs of strikes to both management and workers alike is exemplified by the recent 39-day shutdown at Bendix Radio Div. of Bendix Aviation Corp. in Baltimore, Md. The strike began Sept. 1 when workers voted by a large majority to reject the company's proposal of a wage

increase of 18 cents an hour spread over two years.

When a contract, incorporating a liberal wage boost and generous fringe benefits, was finally approved by the union membership, substantial losses had been suffered by both sides. For example, a company spokesman

stated that a sizable portion of an \$11 million contract to build radios for the Lincoln and Mercury Divs. of Ford Motor Co. had to be considered lost and that parts and tools valued at \$117,821 had already been returned to Ford.

On the other side of the picture, it is estimated that the drain on union welfare and expense funds ran high, in addition to wage losses sustained by the workers. Some 450 jobs may also have been lost, although it seems likely that the workers involved will be at least temporarily occupied in completing radios for which parts were still on hand.

Hint Chevrolet May Expand St. Louis Assembly Plant

Indications that Chevrolet is getting ready to enlarge its manufacturing operations at the St. Louis, Mo., plant, are found in the announcement that all parts activities now housed in the plant will be transferred to a new major parts depot near the city. The new parts depot, which will also house Chevrolet zone offices, will serve dealers in the expanding market area there.

Vehicle Output In Germany Headed for All-time High

A report on Germany's automobile production illustrates the great renaissance that country has undergone since the end of World War II. Harlow H. Curtice, president of General Motors Corp., reviewing the progress of the company's European operations, estimates that Germany's car and truck production this year will reach a record 820,000 units. This figure would represent an increase of more than 140,000 vehicles over the 1954 total.

As far as General Motors is concerned, it is in excellent shape in Germany, according to Mr. Curtice. He predicts that the Opel plant at Russelheim-am-Main will turn out a record 187,000 cars, trucks, and vans this year.

Present sales of the Olympia and Kapitan models produced by Opel are exceptionally high, exceeding production capacity, Mr. Curtice said. The

1955 RETAIL CAR SALES BY PRICE GROUPS*

Number of Cars

		Aug	test			Eight 5	Months	
	195	18	196	14	1961		1984	
Price Group Under \$2,600 \$2,601 to \$2,500 \$2,501 to \$3,500 Over \$3,500	United 366, 836 294, 147 63, 115 17, 236	55, of Total 56.46 31.25 9.00 2.64	Unite! 258,568 116,015 46,301 18,300	55 of Total 89.64 29.67 10.87 3.72	United 2,643,523 1,510,281 830,213 138,984	% of Total 84.68 31.33 11.60 2.84	Unite 1 2,217,364 666,217 386,726 146,432	55, of Total 99, 48 25, 98 19, 73 4, 90
Votal	683,330	190.00	437,905	100,00	4,821,011	100,00	2,714,681	100,00

Dollar Volume of Sales

	August				Eight Months			
	196	8	196	ā	1958		1994	
Price Green Sincler \$2,000 \$2,000 to \$2,000 \$2,000 to \$3,000 Over \$3,000	Dollars 5700,834,841 476,832,114 176,884,824 08,074,286	% of Total 49.24 33.48 12.43 4.88	Dellars \$471,272,739 267,962,565 135,284,867 63,548,666	% of Total 50.73 28.84 13.88 8.84	Dollars \$8,016,775,465 3,825,119,279 1,466,465,921 888,667,977	% of Total 47.38 33.29 14.14 8.24	Deltars 94,030,907,641 2,174,020,731 1,084,009,730 873,084,388	% of Total 91.29 27.61 13.82 7.28
Total	\$1,423,425,278	109.00	1929,006,507	180.00	\$10,590,10%,543	100.00	57,878,272,413	100.00

^{*—}Calculated on basis of new car registrations, as reported by R. L. Polit & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment. †— New registrations of American mode ears solly. Does not include imported torogic care.

AND AVIATION INDUSTRIES

Opel plant currently is undergoing a substantial expansion. When completed next summer, the program will enable Opel to boost annual productive capacity to 250,000 cars, trucks and vans.

AMC Bent on 1956 Sales Of 150,000 Rambler Cars

American Motors Corp leaves no doubt that it is counting on the Rambler line as its "bread and butter" car. George Romney, AMC president, made that point clear at a press preview of the corporation's new models in Wisconsin early in October. He stressed that AMC will operate on a "basic volume" concept using the Rambler as a cornerstone.

American Motors spent about \$21 million on tooling a completely new line of Ramblers. They will be offered in four-door models only, including a hardtop, sedan, and station wagon.

All Ramblers will be on a 108-in. wheelbase with overall length slightly increased, but with exterior width the same as the 1955 model. The car also is about two in. lower than any previous or current production car in the industry. Head, hip, and leg room inside the car are greater than in 1955. Glass area has been increased 30 per cent.

The Rambler will be equipped with a new ohv six-cylinder engine with 30 per cent more output. A power plant in the neighborhood of 118 to 120 hp is thus indicated.

Sales objective for next year is at least 150,000 Ramblers, compared with 82,000 units in 1955. Public announcement of the Rambler is scheduled for early December.

The 1956 models of the Hudson and Nash lines also were previewed. Styling changes on the Hudson, to be announced in December, include a new grille treatment, plus higher front and rear fender appearance. The Nash, which will go on public display later this month, retains its inboard headlamps. Modifications in ornamentation and trim, plus rather major revision of the rear fender treatment, are featured for 1956.

Both Nash and Hudson will have a larger displacement V-8 engine available, and the Statesman Super

TRAVELING TOOL BOX

This traveling tool box, devised by the Maintenance Dept. of Continental Motors Corp., speeds up repair work and cuts down time on
production machinery. The gas-powered Clarkat towing tractor was
fitted with racks, cupboards, and drawers
to hold numerous tools.
Simple frame welded
to body holds ladders,
extra pipes, and other
long items.



model of the Nash will have a sixcylinder ohv power plant.

American Motors has largely completed its integration of Nash and Hudson operations and has concentrated and modernized its manufacturing facilities for maximum production efficiency. Ramblers now are being built on a separate assembly line, and many improvements in the way of modern equipment have put production facilities on a more favorable basis.

Continued on Page 102

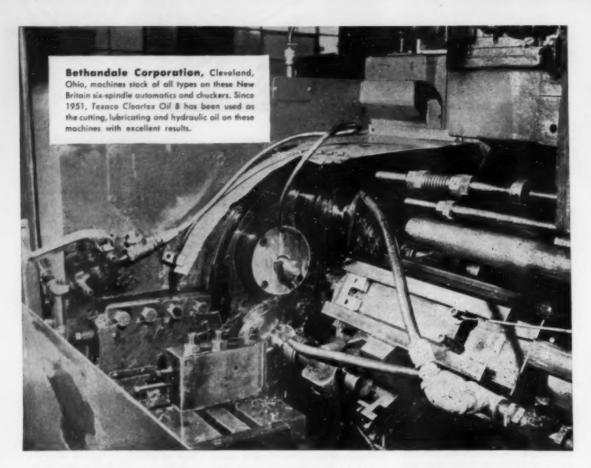
TRUCK SALES CONTINUE STEADY CLIMB OVER 1954

1955 New Truck Registrations*

Arranged by Makes in Descending Order According to the 1955 Eight Months' Totals

					EIGHT M	ONTHS	
	Accessed	late	Account	Un	ilts	Par Cast	of Total
MAKE Chevrolet Ford, Internalional G. M. C. Dodge Willys Truck White Stasfolasker Mack Willys Jose Diamsed Y Divce	August 1985 31, 660 29, 461 9, 284 8, 929 6, 985 1, 206 1, 140 986 1, 061 886 279	July 1988 30, 088 24, 370 8, 900 0, 931 0, 277 1, 284 925 977 800 307 284	August 1694 22,009 21,115 6,532 6,113 4,609 662 794 647 541 150 128	1986 201,168 194,230 60,782 60,049 44,716 10,080 6,980 7,715 6,884 6,384 2,580 2,284	1904 190, 296 980, 213 85, 148 46, 152 40, 346 4, 790 7, 834 7, 335 4, 082 4, 545 1, 511 1, 580	1988 32.96 21.61 11.42 6.29 7.32 1.73 1.47 1.25 1.13 1.06 38	1964 35.43 32.93 9.80 8.21 7.17 .05 1.30 1.30 .72 .06
Recursifi Brockway Poterbilt F. W. D. Federal Misc. Demestic Foroign	100 03 40 23 1 73 229	106 91 33 22 5 100 244	101 34 117 5 21 4 20 38	704 080 302 160 30 665 1,219	481 654 222 288 208 883 207	.31 .12 .11 .06 .63 .18	.27 .00 .10 .04 .65 .04
Total-All Makes	92,679	84,413	84,100	810,875	582,685	180.00	100.00

" Based on data from R. L. Polk & Co.



"We put our stock in Texaco"

Bethandale Corporation, Cleveland, Ohio

THIS JOB SHOP performs a wide variety of cutting operations on all types of steel and non-ferrous materials. Four years ago, they began using Texaco Cleartex Oil B in their automatics, as cutting, lubricating and hydraulic oil. And here's what they say about it:

"We like Texaco Cleartex Oil B particularly because of its tri-purpose features and its versatility. We can use the one oil on steels, brass, other metals -even copper-and be sure of excellent finish, long tool life, and no corrosion. And the fact that Texaco Cleartex Oil B keeps the lubricating sides of our automatics clean means a savings in maintenance costs."

Texaco Cleartex Oil B is one of a complete line of Texaco Cutting, Grinding and Soluble Oils. Whatever the stock, however you machine it—there's one of these superior oils exactly right to assure better, faster machining at lower cost.

To help you select the proper one, consult a Texaco Lubrication Engineer. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TUNE IN...TEXACO STAR THEATER starring JIMMY DURANTE on television...Saturday nights, NBC.

Men in the News



Caterpillar Tractor Co.—G. E. Burks was elected a vice-president.

Plymouth Div., Chrysler Corp.—W. H. Allen has been promoted to staff plant engineer.

Cadillac Motor Car Div., General Motors Corp.—Robert J. Ackerman has been appointed assistant works manager.

Eaton Mfg. Co., Stamping Div.— A. D. Schultz has been promoted to chief engineer.

Fuller Mfg. Co.—Robert W. Firlik is now sales research analyst.

Binks Mfg. Co.—John E. Rowe has been elected to the board of directors.

Chrysler Corp.—Thomas F. Morrow has been appointed assistant group executive for Defense and Special Products.

Brubaker Tool Corp.—J. W. Elliott was elected vice-president.

Trabon Engineering Corp.—E. W. Baumgardner has been made sales manager.

Republic Aviation Corp.—John A. Alexander, Jr., was named conservation director.

Willard Storage Battery Co.—John S. Harbison, Jr., has been appointed manager of replacement sales.

R. M. Hollingshead Corp.—George F. Sharrard has been made director of research and development.

Brush Electronics Co.—Perry C. Smith is now manager of the Equipment Dept.



Sanbarn Co.—Maurice S. Hartley has become director of engineering.



Pratt & Whitney Co., Inc., Machine Tool Div.—Albert L. Knapp was appointed vice-president and manager, and Jacob J. Jaeger was named vice-president and chief angineer.

American Motors Corp., Fleet Sales Div.—W. B. Ramsey has been promoted to director.

Bendix Aviation Corp.—F. C. Weyburne has been appointed general manager of the Skinner Div., in addition to his present similar post at Marshall-Eclipse Div.

Du Pont Co.—G. Raymond Maher is now assistant automotive sales manager of the Fabrics and Finishes Dept.

Carboloy Dept., General Electric Co.—E. J. Weller has been named manager of a new carbide products design engineering section.

H. K. Porter Co.—Robert C. Houser has been elected treasurer; Rocco J. DiFonso, assistant treasurer; and Edward R. Moran, assistant secretary.

Hyster Co.—Daniel J. Sheehan was named general parts and service manager, and James L. Woodley was made manager of the Danville, Ill., manufacturing plant.

Joseph T. Ryerson & Son, Inc.— Harold E. Stavers has been appointed sales manager for the Detroit steel service plant.

Consolidated Engineering Corp.— Charles C. Snider has been named manager of field sales.





Chrysler Div., Chrysler Corp.—G. T. Pairier has been appointed general manager at manufacturing.



Caterpillar Tractor Co. — Dale Wright has been appointed chief metallurgist; T. W. Peck, heat treat manager; and R. C. Brown, director of research.

Modern Engineering Co. — A. J. Fausek has been named chairman of the hoard.

Michiana Products Corp.—Norman E. Seymour has been appointed works manager of the Steel Fabricating and Oil Filter Divs.

(Turn to page 104, please)

Necrology

Alfred Moorhouse, 71, former chief engineer for Packard Motor Car Co., died Oct. 7, at Detroit, Mich.

William F. Pioch, Sr., retired executive staff engineer for Ford Motor Co., died Oct. 3, at Detroit, Mich.

Stanley Frost, 57, vice-president and general manager of Precision Castings Co., died Oct. 8, at Kalamazoo, Mich.

John S. Burdick, 78, chief designer for the Locomobile Co. and one-time vice-president in charge of engineering at the Buffalo Body Co., died recently, at Buffalo, N. Y.

John Turner, 70, president of Canadian Lift Truck Co., Ltd., died Oct. 3, at Montreal, Canada.

Edward C. Madgeburger, 69, retired Diesel engine expert, died Oct. 11, at Sandy Spring, Md.

Carl E. Paulsen, 57, former plant superintendent and vicepresident of Detroit Broach Co., died Oct. 9, at Detroit, Mich.

Pinpointing demands

Because of their vital function, the gear trains in the new allweather bomb director systems must be made to tolerances not long

ago considered impractical. That's why Norden-Ketay relies upon Fellows equipment to keep both costs and quality under control.

THE PRECISION LINE

invisible targets HIGH PRECISION GEARS

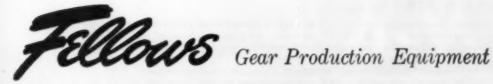
Altitude: 40,000 feet! Ceiling: zero! The bombardier pushes a button...the automatic bomb director system goes into action... and another bull's eye is scored without even seeing the target!

The keynote of this amazing electro-mechanical mechanism, made by the Instrument and Systems Division, Norden-Ketay, is PRECISION. Because precision gears and gear trains play such a vital role, Norden-Ketay have built much of their production capacity around Fellows Equipment.

Fellows Precision Line offers a most efficient cost and quality control in the cutting, shaving and inspecting of fine-pitch gears. These machines and tools are fully integrated to provide a coordinated, balanced combination for close tolerance control in every step of gear production. The result: quality, economy and "unified" responsibility.

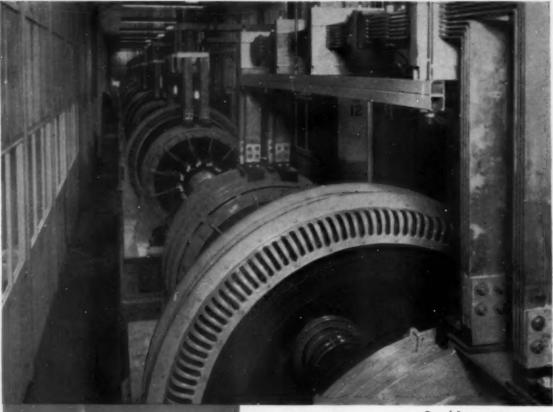
WRITE, WIRE or PHONE any Fellows Office for the information about the most recent developments in the Fellows line for fine pitch gears. If desired, they will give you all the facts about the Fellows Plan for Deferred Payment, too.

THE FELLOWS GEAR SHAPER COMPANY, THE FELLOWS GEAR SHAFER COMPARY,
78 River Street, Springfield, Vermont.
Branch Offices: 319 Fisher Building, Detroit 2
5835 West North Avenue, Chicago 39
2206 Empire State Building, New York 1
6214 West Manchester Avenue, Los Angeles 45



625,000 Amps!

FOR THE WORLD'S LARGEST PLATING PLANT



One of 5 generator rooms

Chandeysson.

Chandeysson

ELECTROLYTIC

GENERATORS

Plating at the rate of one bumper every three seconds... 19,200 per day...allows little time for interruption. To assure a dependable, high-efficiency power supply for this mammoth, automatic plating plant, 48 brute-size Chandeysson motor generators were chosen.

Chandeysson generators were specified exclusively for this multimillion-dollar installation because of their outstanding reputation for trouble-free operation, low maintenance and high overall efficiency...and, for their ability to withstand repeated heavy overloads without damage of any sort.

YOU SAVE 4 WAYS...

USE LESS POWER ... precision-built for efficiency and built-in voltage regulation.

GET MORE OUT OF THE POWER YOU PAY FOR .. built-in high power factor at no extra cost.

BE SURE OF POWER WHEN YOU NEED IT MOST... Chandeysson users report capacity in excess of published statements of 150% momentary and 125% sustained loads, without distress or damage.

ENJOY LIFETIME POWER DIVIDENDS... sustained, lifetime overall constant efficiency as high as 85% does not decrease with age or overload.

CHANDEYSSON ELECTRIC COMPANY . 4870 Binghom Ave. . 51. Louis 16, Missouri

BUTTON CONTACTS NOW A-MP AUTOMATED FOR LESS COST— MORE RELIABILITY

Another new product, A-MP Automated to reduce cost! This new solderless Button Contact especially designed for automotive and appliance light sockets is made in strip terminal form and supplied on reels for automatic machine application. High speed automated terminations assure uniform high quality and cost savings.

This advanced A-MP Button Contact design provides the following features:

- Adequate clearance, where space is limited, for twin contact application.
- Chamfered edges to permit easy rotation of bulb when locking into twin contact socket.
- Special tapered section to secure this Button Contact in phenolic insulating washer.
- A-MP's patented Keystone Serrated solderless crimp provides the ultimate in electrical and mechanical performance.
- Available for wire sizes 18 thru 14 AWG, in plain brase, tin plated or silver plated finish.



Send today for your copy of our brochure AMP's Creative Approach to Better Wiring.

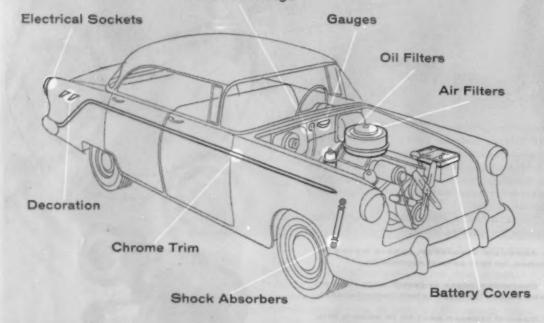


AIRCRAFT - MARINE PRODUCTS, INC. General Office Harrisburg, Pennsylvania In Canada: AIRCRAFT-MARINE PRODUCTS OF CANADA, LTD., 1764 Avenue Road, Toronto 12, Ontario, Canada

Automotive Parts Manufacturers

are cutting costs for gaskets on all of these automotive parts

Knock-out Plugs



COMPOUND	BASE	ADHESION TO METAL	HEAT RESISTANCE	OIL RESISTANCE	AGING
H 637	Vinyl	Excellent	-20°F to 250°	-	Excellent
N 779	Neoprene	Good	-20°F to 300°	Excellent	Excellent
W 502	Neoprene	Good	0°F to 300°	Good	Excellent

...with Dewey and Almy's

DAREX Flowed-in

Gasket Process

If you are now manufacturing automotive parts which require gaskets to seal, cushion, contain pressure, or form a hermetic seal ... the DAREX "Flowed-in" Process can increase both production and quality of your product, and at the same time cut labor and materials costs.

In the DAREX "Flowed-in" Process, a uniform track of liquid gasketing compound is deposited onto the automotive part. Baking or drying transforms this fluid into a solid, rubbery gasket that becomes an integral component of the part.



Some of the standard DAREX "Flowedin" compounds now being used by the automobile industry are described in the chart below.

More and more auto parts manufacturers are now using DAREX "Flowed-in" gaskets to replace traditionally costly sealing methods. With the DAREX "Flowed-in" Process, timeconsuming hand assembly of gasket to part is eliminated. Materials costs are lowered by minimizing waste and improving quality. Inventory and handling costs are drastically reduced.

DAREX "Flowed-in" gasket compounds are formulated to produce the exact gasket you need for your particular set of requirements. Properties such as viscosity and flow can be so carefully controlled that a minimum of compound is required for full sealing

Specially designed machinery to apply and cure DAREX "Flowed-in" gaskets is now available in automatic and semi-automatic models. Basic DAREX machines, fitted out to handle your parts and timed to conform with your schedule, can be adapted to fit into your present production scheme. And Dewey and Almy field service engineers are ready to set up machinery in your plant and train your operators to full proficiency in the DAREX "Flowed-in" Gasket Process.

DEWEY and ALMY

Chemical Company

DIVISION OF W. R. GRACE & Co. Combridge 40, Mass.

PERMANENT SET	CURING	CONSISTENCY	USES	COMPOUND
80%	20 Seconds	Rubbery	wherever integral nut, washer, gasket assemblies are used as a hermetic seal.	H 637
30-35%	5-10 Minutes	Rubbery	wherever gaskets must seal against oil leakage or pressure, as on electric motor caps.	N.779
30%	10-20 Minutes	Spongy	oil filters, air filters and other metal to metal seals.	W 502

New PACKARD Has 310 Hp Engine WITH 374 CU. IN. DISPLACEMENT

ost powerful, high-compression V-8 engines for maximum acceleration ability in normal speed ranges, an automatic transmission with "two-stage" passing gear and push button control, a non-slip differential, interlocking safety door latches and improved styling are high spots of the 1956 Packards.

Available in a distinctive selection of bodies, one of which is completely new for 1956, newlystyled Packard models have new

hood and rear deck lines that result in a lower, broader appearance from both inside and outside of the cars.

Streamlined bumper guards are outboard 10 in. and placed directly below headlights which have been lowered one inch for 1956. Repositioning of the headlights was made possible because of the Packard "level-ride" on a torsion bar suspension system.

A heavier, stronger grille is accented by a fine screen background, and a second grille designed into the opening under the main bars enhances the frontal horizontal lines. New rear deck lines give the car a crisper appearance and provide a substantial increase in luggage space.

The new line is represented by a Packard Caribbean convertible; a Packard Caribbean hardtop; a Packard Patrician (four-door sedan), and a Packard Four-Hundred (hardtop). The Caribbean hardtop model is new to the Packard line for 1956.

Packard 1956 models are powered by the industry's largest displacement and most powerful V-8 engines, with the power most prominent in normal driving ranges.

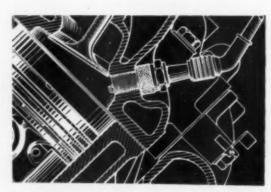
A new 310-hp V-8, with a torque rating of 405 lb ft at 2800 rpm, is in Packard Caribbean models. A 290-hp V-8, with a torque rating of 405 lb ft at 2800 rpm, is in Packard Patrician and Four-Hundred models. Both V-8 engines are of 374 cu in. displacement.

Both engines operate at a 10 to 1 compression ratio. It is claimed that they do not require use of premium grade fuels.

The high torque characteristics of Packard V-8 engines permit use of a 2.87 rear axle ratio with Ultramatic transmission, as compared with a 2.96 ratio for overdrive transmission. The Ultramatic



Packard Four-Hundred model



Among the engine features for 1956 are a new combustion chamber design and a "long reach" spark plug

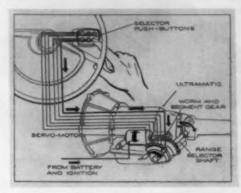
transmission offers two "kick-down" ranges which result in maximum acceleration for any driving range. The first "kick-down" for increased acceleration force may be utilized between speeds of 10 to 45 mph, and is most effective between 20-40 mph. This "kick-down" may be obtained by depressing the accelerator half-way to the floorboard. The driver may take advantage of the second "kick-down" by depressing the accelerator to full throttle.

The electric push-button Ultramatic automatic transmission, with a "safety-park" feature, also prevents shifting into "Park" or "Reverse" when car is moving forward at speeds over five miles per hour. The same touch-pressure will activate any push-button.

The push-button console is backlighted and this backlighting may be adjusted for brightness or

CONDENSED SPECIFICATIONS-NEW PACKARD ENGINES

	Patrician	Caribbean		
	Packard 400	Caribbean Hardtop		
Туре	V-8 Valv	re-In Head		
Torque	405 ft. lbs. @ 2800 rpm.	405 ft. lbs. @ 2800 rpm.		
Brake Hersepower	290 @ 4600 rpm.	310 @ 4600 rpm.		
Displacement	374 cu. in.	374 eu. in.		
Bore	41/4"	41/6"		
Stroke	31/2"	31/2"		
Compression Ratio	10 to 1	10 to 1		
Bearings	5	5		
Oil Capacity	5 qt.	5 qt.		
Carbureter	Four-Barrel	Dual Feur-Barrel		



Schematic diagram of the electric push-button drive control

Push-buttons for drive control are located in a console at the right of the steering column

dimness. Each push-button, when activated, glows more brightly than the others.

Removal of the ignition key, with the "Park" button depressed, leaves the transmission automatically locked in "Park," and it cannot be disengaged without opening the ignition circuit with the ignition key.

Packard's development of a new differential represents the first major change of automotive differentials for regular production cars in more than 30 years. In that time there have been no fundamental changes in differential design, only refinements of existing principles. It is said to overcome the drawbacks of conventional differentials by



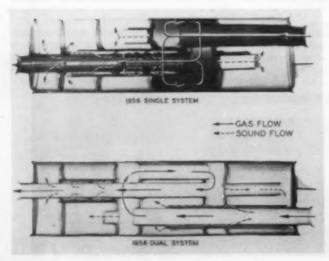
sensing the most effective proportion of driving force for transmission to the rear wheels of a car, depending on the requirements of specific driving situations. The non- (Turn to page 112, please)



New addition to the line for 1956, the Caribbean hardtop

The new rear axie used on Series 70 cars has an oil pump mounted on the right pedestal of the differential carrier. It draws oil from the sump and jets it onto the gears.

on 1956 Buick offers the 322 cu in. high compression, valve-in-head engine in all series, featuring higher compression ratios and other detail improvements to lift power and torque ratings above the levels of last year. From a mechanical standpoint the Buick line is replete with numerous improvements, including adoption of the new type Saginaw power steering gear which will be standard equipment on Series 50 and 70, optional on 40 and 60 models. Front suspension also has been improved materially.



Part cutaway views of the new mufflers.

One Size Engine

Series 40 and 60 models have a 122-in. wheelbase; Series 50 and 70, 127 in. Front tread is 59 in. on all models; rear tread is 59 in. on Series 40 and 60; 62.2 in. on Series 50 and 70.

Basic body design remains substantially unchanged except for fresh exterior styling treatment of ornaments, moldings, lamps, bumpers, etc. All series have the full rear fender wheel cut. The radiator grille is of a new design, of screen type with the body polished, chromium plated and buffed to a high luster. Access to the engine compartment is facilitated by a new gear-type hood hinge, a self-contained unit housing the spring, serving to shift the hood to rear when opened.

The line up of body styles for 1956 is as follows: Series 40: two-door convertible, two-door hardtop, four-door sedan, four-door station wagon, two-door sedan; Series 60: two-door convertible, two-door hardtop, four-door hardtop, four-door station wagon; Series 50 and 75: two-door convertible, two-door hardtop, four-door hardtop, and four-door sedan.

Condensed mechanical specifications, reproduced here, give the significant facts on engine data and it will suffice at this point to note that compression ratio for all but the Series 40 has been boosted to 9.5 to 1, Series 40 being 8.9 to 1. With Dynaflow the Series 40 engine is rated 220 hp, while the other series are upped to 255 hp.

Here are some of the detail changes in engine setups. First of all the combustion chamber has been relieved around both valves sides for improved breathing. Connecting rod design has been modified by using pressed-in piston pins. eliminating the pinch bolt formerly used. Connecting rod material now is of SAE 1141, a higher manganese alloy, contributing to increased strength and durability. On pistons, the height of the dome has been increased to accommodate the compression ratio increase while the slope of the piston dome on the valve side has been changed to 30 deg to improve breathing. Increased piston strength is promised by a redistribution of metal inside the piston.

Intake manifolds are new. To improve warm-up operation the heat jacket has been so revised as to reduce the amount of heat on the T-section and add it to the floor of the riser. Inlet passages in both two-barrel and four-barrel manifolds are similar in arrangement.

for All New Buicks

Condensed Mechanical Specifications Buick V-8 Valve-in-Head Engines

Model	Series 40	Series 50-60-70
Bore (in.)	4.00	4.00
Stroke (in.)	3.20	3.20
Displacement (cu in.)	322	322
Compression ratio: Dynaflow Synch.	8.9 to 1 7.6 to 1	9.5 to 1
Bhp (max.) Dynaflow	220 @ 4400 rpm	255 @ 4400 rpm
Torque (lb ft) max: Dynaflow	319 @ 2400 rpm	341 @ 3200 rpm
Bhp/cu in. (max)	0.683	0.792
Torque/cu in. (max)	0.990	1.059

Dual exhaust systems are standard on Series 70, optional on the others. Series 40, 50, and 60 engines will have a completely redesigned single exhaust system. The principle behind the new exhaust systems is centered about a fresh concept, said to be an improvement over the usual exhaust header arrangement. These manifolds, termed double Y-type, provide for a separation of 270 crankshaft degrees between the cycles of cylinders exhausting into any manifold branch, thus virtually eliminating overlap. This is accomplished by means of

two separate branches in each manifold joining at a common outlet at a point just above the flange. The double-Y right hand manifold is common to both single and dual exhaust systems. The inlet manifold heat valve is incorporated in this manifold to simplify manufacturing.

Two new left hand manifolds, both of double-Y type, are also provided. All of the manifolding is said to offer better directional control of exhaust gases.

It is also of interest that the exhaust system will utilize ball joint pipe connectors to improve alignment and eliminate binds. Any individual section can be removed without affecting the other parts of the system.

A new three-tube reverse flow muffler is used with dual exhaust. It incorporates aluminum-coated parts in the high heat zones for added life and reduced weight. Mufflers are interchangeable on either side of dual exhaust systems.

On Series 40 clutch plate, the effective area has been increased because of larger engine, the crown pressure spring being replaced by a coil spring cluster. The clutch pedal is of suspended type with the equalizer relocated on top of the frame rail.

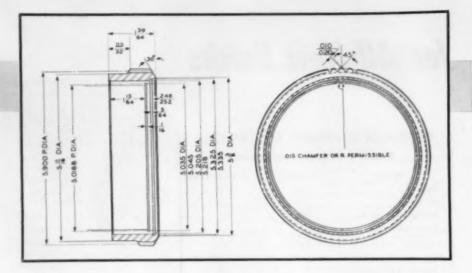
Valve timing for Dynaflow equipped cars has been changed—exhaust valves opening three degrees earlier, closing two degrees later; while intake valves open two degrees earlier, closing

(Turn to page 116, please)



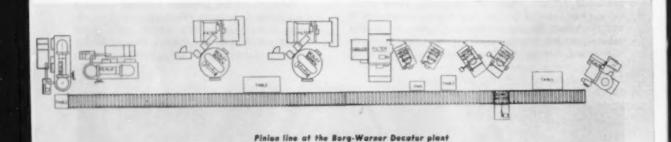
Series 40 hardtop sedan.

Ford-O-Matic ring goar



HOW

Close Tolerances Are Held for AUTOMATIC TRANSMISSION GEARS



Mass production and high quality run hand-inhand for Ford-O-Matic automatic transmismission gears produced at the new Decatur, Ill., plant of Borg-Warner's Transmission Department. The new facility was described in the August 15 issue of Automotive Industries.

Borg-Warner has set up a very stringent quality control procedure for the gear manufacturing department. Before any tooling is used on the ring gear or pinion lines, it is checked by the gear laboratory.

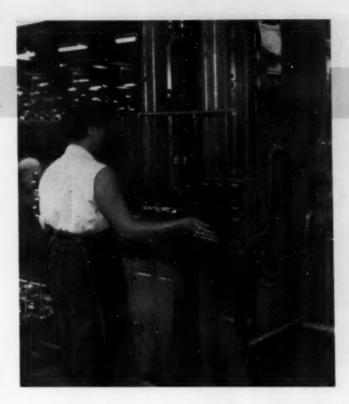
According to the procedure, the gear laboratory inspects the ID of new hobs shapers and shaving cutters, visually checks the OD and tooth condition, and records the serial numbers. This technique is also carried out for reground shaving cutters. If the hob

or shaper has been reground, the number of grinds and tooth condition are recorded by the cutter grind section. The cutter grinding section is also responsible for inspecting regrinds for hook, lead, and finish.

After the tooling is installed on the production line, the first workpiece produced from new or reground tools must be sent to the gear laboratory for approval. The gear laboratory also checks all pinion shavers every two hours or 400 pieces.

There are five main pieces of gearing manufactured here. These are the short pinion, long pinion, ring gear, forward sun gear, and reverse sun gear. The first three are discussed in this article.

The ring gear is made of either SAE 4047 or SAE 5140 steel and has the following characteristics:



Spiral broaching is used for intersal toeth on the ring gene; tooling is made by National Broach; the machine—as American with Barnesdril magnetic separator

By Thomas Mac New

The first operation is done in a Surface Combustion furnace where the ring gear blank is annealed. Parts are then transported to a Pangborn continuous blast machine for cleaning.

Initial machining operations are carried out on a six-spindle Bullard equipped with 10 in. chucks. The part is chucked in the ID and stopped against the rear face. This machine rough and finish faces the front end, chamfers the ID, bores the ID part way, rough and finish turns the OD ahead of the gear member, and rough turns the OD of the gear

member. This gear is shown on the opposite page.

An eight-spindle Bullard is used for the second operation. This time the OD of the blank is gripped ahead of the gear member with the front end butted against the chuck. In this eight-station machine, two counterbores are machined in the rear end of the blank at the first station. Next the ID is rough bored through and a 30 deg angle on the rear of the gear member is cut. After rough facing the rear end, the ID bore is finished and the 30 deg angle is finish turned. In the final three stations of the Bullard, the OD of the gear member is finished, the ID of the large counterbore is chamfered, the two rear counterbores are finished, a recess and snap ring groove are machined, and a reaming operation is performed.

Internal teeth are cut in the blank with a spiral broach, made by National Broach, on a dual ram American broaching machine equipped with a Barnesdril magnetic separator. The two-station feed slide is manually loaded. Borg-Warner claims an extremely high quality with the spiral broaching technique.

Work is then washed and set up in a Cross chamfering machine used for cutting the chamfer of the acute angle on the front of the internal teeth. After another wash, the workpiece is located in another American broaching machine equipped with a National Broach spiral tool for finishing the internal teeth. Again the part is washed.

After locating the part on the pitch diameter of the internal teeth, the external teeth are finish cut on a

Internal Gear Data

No. teeth	72
Normal pitch	
Normal pressure angle	
Diametral pitch	14.3518
Transverse pressure angle	18°48′18″
Base circle diameter	4.7490"
Helix angle	22°11′30" R.H.
Lead	38.6364"
Addendum	0.0465"
Dedendum	0.1051"
Full depth	0.1516"
Normal circular tooth thickness	0.0867-0.0853"
Maximum permissible involute profile e	rror ±0.0005"
Maximum tooth to tooth spacing error	0.0005"
Lead error per inch of face width	0.0020" max.
Accumulated tooth spacing error	0.0020" max.

External Gear Data

No. teeth	
Diametral pitch	
Pressure angle	20°
Base circle diameter	. 5.54417"
Addendum	0.050"
Dedendum	0.080"
Full depth	0.130"
Corrected addendum 0.051 when Ol	D is 6.000"
Chordal thickness	0.135-0.140
Theoretical arc tooth space at PD	0.179-0.174
Root diameter	5.730-5.745

Michigan Shear Speed. A hydraulic clamping device is used for the operation. Outside pitch diameter is then checked with a Federal gage.

A two-spindle, single-end Ex-Cell-O boring machine finish turns and chamfers a 5 11/16 in. diameter ahead of the external teeth. It also forms a radius and angle ahead of the external gear.

Osborn wire brushes are utilized to clean up the external member before the finished ring gear is washed and inspected. Various National Broach and Illinois Tool inspection machines have been purchased for the final checks.

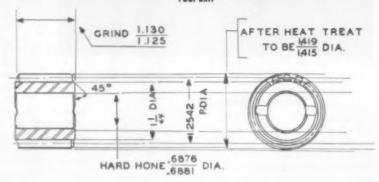
The part is then heated in a dry cyanide atmosphere in a Surface Combustion furnace and next quenched in oil. Osborn wire brushes remove burrs from the internal teeth, and the work is cleaned in a Rotoblast machine.

A Red Ring 14 in. gear speeder performs the final operation by speeding the ring gear with the transmission long pinion gear.

For the transmission long pinion, SAE 4047 or 5140 steel in 1½ in. diameter bars is used as the raw material. These pinions are finished as follows:



Short pinions are chamfered in the Cross machine and then shaved in the Michigan
Tool unit



Short pinion for the transmission

Gear Data

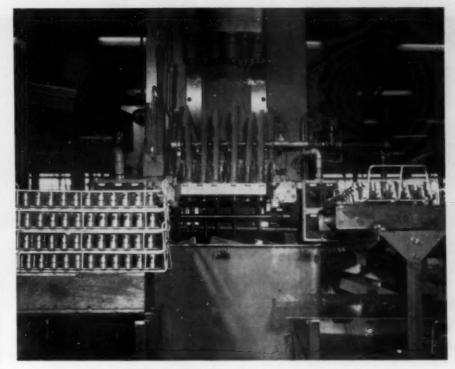
No. teeth	18
Normal pitch	
Normal pressure angle	
Diametral pitch	14.3518"
Transverse pressure angle	.18°48'18"
Base circle diameter	1.18726"
Helix angle R.H.	22°11′30″
Lead	9.6591"
Addendum	
Dedendum	
Full depth	
Corrected addendum 0.0846 at	1.419" OD
Circular tooth thickness . 0.1	
Backlash	
Maximum tooth to tooth spacing error	
Maximum permissible Involute profile err	
	to +0.0012"
Effective crown	

Maximum crown to be central on each gear face Lead error per inch of face width 0.0010" maximum Accumulated tooth spacing error 0.0010" maximum

Cone automatic screw machines are used for the initial machining on the long pinion. These eightspindle machines drill, rough and finish ream the bore, rough turn and shave the OD, straddle face, chamfer the OD, and cut off.

Following a wash, the hole is broached to size in an American Broach six-station machine. The machine is fed automatically by hoppers which are manually loaded. A Sheffield Precisionaire is used to inspect the hole size and classify the pinions in three groups—0.6854-0.6856 in. in red baskets, 0.6857-0.6859 in. in plain baskets, and 0.6880-0.6862 in. in black baskets. All pinions are then hobbed and shaved on machines with arbors of corresponding size.

A battery of automatic Cleveland single spindle hobbers are used to semi-finish cut the spiral teeth. The workpiece is then washed and chamfered on a



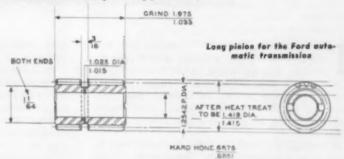
American broach used for sizing the long pinion bere

Cross chamfering machine. This unit works on the acute angles on both ends of the teeth. Another chamfering machine, a Modern, cuts both sides of the teeth on each side of the groove. Osborn wire brushes are used to clean up the slot and the teeth.

The short end of teeth is shaved in a Red Ring rotary that is automatically fed. Red Rings are also utilized for shaving the long gear member. Work is then given five checks—pitch diameter, pitch diameter runout, root diameter, lead, and involute. These are the checks made from the shavers every two hours or 400 pieces. Tolerances permitted in the order of above listing are: 0.002, 0.001, 0.010, 0.0002, and 0.0002 in. Parts are next carburized in a Surface Combustion unit and given a blast cleaning.

Oil grooves are ground on a Heald rotary surface grinder. A Besly-Bowen wet grinder finishes both ends of the pinion. Micromatics hone the hole to size; the ID is checked on Sheffield equipment. Both end faces

(Turn to page 136, please)





Long pinions are fed to this group of Red Ring machines for shaving operations



Bel Air Sport sedan, new in the Chevrolet line this year

THE latest model Chevrolet passenger cars have increased horsepower, a fleeter, more rugged appearance and are offered in the broadest array of bodies ever produced by the company. New for 1956 is a four-door hard-top sport sedan. Also introduced for the first time are nine-passenger station wagons, bringing the company's total number of 1956 bodies to 19.

In addition to sixes, the 1956 Chevrolets may be powered by a variety of V-8s. One develops 162-hp and is installed in cars with the standard shift. The second is designed for Powerglide and produces 170-hp. The Super Turbo Fire with four-barrel carburetor has an output of 205-hp. Fitted with a new head, the compression ratio of the Super is 9.25 to 1.

Refinements to the V-8s include a new high lift camshaft which results in more power for the regular Turbo Fire Powerglide engine and the Super. Hydraulic valve lifters are standard on all eights which also have improved lubrication to the overhead valve mechanism. Full pressure oil is supplied to the valve lifter gallery with metered pressure to the overhead mechanism. Another high spot is a full flow oil filter as an optional item. The filter is attached to the block, and should flow through the system be restricted for any reason, the oil is by-passed around the filter.

In place of the two sixes of different horsepower that were present in the 1955 line, six-cylinder output will be concentrated on one 140-hp engine with an 8 to 1 compression ratio. This engine may be coupled with either the Powerglide automatic transmission, overdrive, or the manual shift.

Of traditional valve-in-head design, the new six is equipped with a high lift camshaft, hydraulic valve lifters and extra alloy exhaust valves which are aldipped to minimize the build-up of deposits.

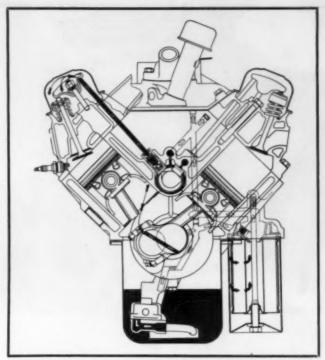
A new method of mounting V-8 generators reduces vibration and noise. To guard against water and foreign matter, the starting motor plunger is shielded by a neoprene boot. Wiring harness is divided into two sections which connect at the dash panel to facilitate assembly and servicing. A shroud on the air cleaners makes for quieter operation.

A woven asbestos composition clutch facing is used for V-8s. A high capacity clutch of coil spring design replaces the diaphragm spring clutch on Super Turbo Fire V-8 models.

Rear engine mounts have been re-formed for isolation of noise and vibration. An electric water temperature gauge replaces the former tube type. Enlarged exhaust cross-over passages will make for quicker warm-up in cold weather. Dual exhausts are extended to station wagons where the Super Turbo Fire V-8 is specified.

New sealed beam headlamps give better illumination of roadside ditches and are standard on all cars. A precision headlamp aiming device is exclusive in Chevrolet's field. Directional signals, formerly an extra cost item, are now standard equipment.

The following bodies will be available in the 1956



Transverse section of 1956 Chevrolet V8 engine showing arrangement of the new oil filter and oil passages to moving parts of the angine

Chevrolet line. One-Fifty Series—Two- and four-door sedans, utility sedan and two-door, six-passenger station wagon. Two-Ten Series—Two- and four-door sedans, Delray coupe, sport coupe and sedan, two- and four-door six-passenger station wagons and four-door, nine-passenger station wagon. Bel Air Series—Two- and four-door sedans, sport coupe and sport sedan, convertible, Nomad station wagon and 4-door, nine-passenger station wagon.

These 19 models compare with 14 available at the

start of production in the year 1955.

The nine-passenger station wagons are built for complete use of the cargo area when the seating capacity is not required. In the body the third of three rows of seats is removable. The second row, with a divided hinged seat to afford easy access to the rear, can be folded into the floor. It is thus possible to utilize all of the space back of the driver's seat for load.

Optional equipment in the 1955 line again is offered. This includes the over-drive, power steering, power brakes and push-button control of seat adjustment and window lifts. An air-conditioning mechanism that fits under the hood and tinted glass are other optional items.

In the 1956 Chevrolet, completely new sheet metal complements a more massive grille in all models. The grille is a wider, lattice-work design and a heavier chromium header bar. Fender lines at the front and rear are higher and straighter. The hood plane is flatter and extends four inches farther forward before dipping to meet the grille. Parking lamps are square and set low over the re-shaped bumpers. A novelty is the location of the gasoline filler, concealed by the hinged rear left tail lamp.

Among safety features in the 1956 Chevrolet line are the optional seat belts and shoulder harness; improved headlights and door locks that minimize the possibility of being sprung open by collision.

The safety lock was introduced on Chevrolet models last summer. The design includes a flange on the door portion of the car which overlaps another flange on the striker mounted on the body pillar. The overlap, or interlock, is designed to prevent disengagement of the two parts in event of a collision.

Swedish Producer Offers Unusual Factory Warranty

Aktiebolaget Volvo of Gothenberg, Sweden, major producer of automobiles, trucks, buses, and engines in Scandinavia, introduced early this year an unusual kind of factory guarantee that may be of some interest to automotive manufacturers the world over. Details of this new agreement between Volvo and buyers of its cars were explained to Joseph Geschelin, Detroit Editor of Automotive Industries, in an interview during his visit to Sweden this summer.

It is a unique arrangement under which the factory obligates itself to repair all collision damage for five years as a part of the regular new car guarantee. The owner pay a minimum fee only in the event of accident.

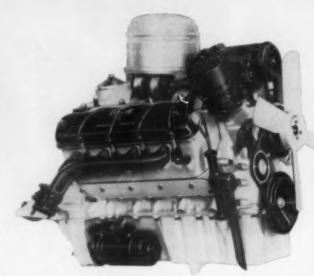
Every new car buyer receives a factory guarantee that covers him against collision damage for a period of five years. This guarantee is given without any cost to the car owner. In the event of collision, the owner takes his car to an authorized Volvo dealer and gets an estimate of the total cost of sheet metal repairs, painting, etc. Regardless of the amount involved, the Volvo owner pays the dealer a fixed sum of 200 Swedish Kroner (\$40).

Thus, in the event of a serious collision, the owner pays a maximum of \$40 for a complete sheet metal repair.

Any amount in excess of this is charged back to the Volvo factory by the dealer.

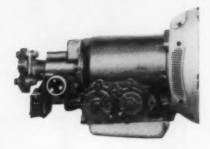
Motor Boat Show Draws Scores of Exhibitors

Two hundred and thirty-two boat builders, marine engine manufacturers, and producers of nautical accessories have been allotted space in the 46th annual National Motor Boat Show to be held at Kingsbridge Armory in New York City from Jan. 13 to Jan. 22, 1956. The exposition will have more than 100,000 sq ft of exhibit space.



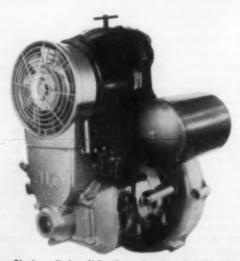
BMW eight-cylinder all light alloy engine

Mercedes Type 300 with Borg-Warner automatic transmission



BMW eight-cylinder sports tourer

Frankfort Show

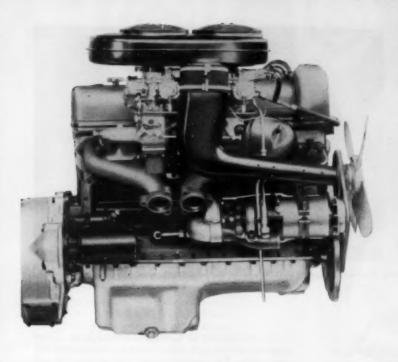


Single cylinder JLO 40 cu in. aircooled Diesel

FRANKFORT, GERMANY
HE 37th German automobile show, held during late
September and early October after a lapse of 2½ years,
wealed a fast growing industry that is now the second

revealed a fast growing industry that is now the second largest automobile manufacturing group in Europe. Total production for 1954 was 680,597 automobiles, while for the first seven months of this year, output was just on the half million mark. Exports from Germany, which were 11.1 per cent in 1948, have risen to 46.8 per cent of output during the first half of this year. The biggest importers are Switzerland, Belgium, Holland, Denmark and Sweden.

Volkswagen revealed only minor changes, among such as greater leg room at the rear, adjustable front seats, more baggage space, and improved lighting. The millionth Volkswagen came off the assembly line last August, and output



Reveals Fast Growth of GERMAN AUTOMOBILE INDUSTRY

By W. F. Bradley

Special European Correspondent for AUTOMOTIVE INDUSTRIES

is now 1300 per day, including the six types of light commercial vehicles using passenger car chassis components. A new factory for the commercial line will soon go into operation, thus allowing increased passenger car production in the present plant.

This year Mercedes introduced five new models, and in addition, the Model 300 with a six cylinder engine of 182.8 cu in. is being supplied on order with a Borg-Warner automatic transmission. This model has the single joint rear axle with low pivot point, developed from racing car practice.

Among the new models is the "220" two-door convertible equipped with a six cylinder 134 cu in. engine. The "220" model is now provided with vacuum power brakes. The 190 SL, which has been in production

for some time as a sports car, is now being produced as a coupe. The top is fixed at six points and is designed for quick removal for conversion to a completely open car. The 190 SL has a four cylinder engine of 115.88 cu in. developing 120 hp at 5700 rpm. It has two Solex dual horizontal carburetors and an oil-water heat exchanger. Mercedes announces its intention of continuing fuel injection, as used on the racing and sportsracing models. It is used on the 300 SL, 182.8 cu in. six cylinder model which develops 240 hp at 6100 rpm. This engine has a compression ratio of 8.55 to 1. Chassis construction is tubular frame of pyramid design, with welded steel tubes.

Additions to the Mercedes line include a light bus of 10 to 18 passenger capacity, equipped with the 107.8 cu in. Diesel engine developing 46 hp at 3500 rpm and the L 319 light truck and delivery van. The L 319 uses the same Diesel engine as the bus and is available with various types of commercial bodies. The Unimog, which has been on the market for several years with a four cylinder engine, is now produced with a six-cylinder gasoline engine of 133.9 cu in. It has four wheel drive with a locking differential, a six-speed transmission and, as in the case of the former model, is designed for power-takeoff.

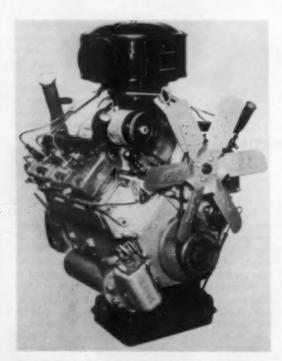
Porsche's new model, the Carrera, has a larger piston displacement of 96.5 cu in. This was done by increasing the bore of the standard Porsche engine by a 0.1 in., the stroke remaining the same. This rear-engine, four-cylinder, overhead camshaft model has a compression ratio of 8.5 to 1 for the sports type and 7.5 to 1

for the conventional model. It has a rated output of 97 hp at 5800 rpm with a top of 100 hp at 6200 rpm. This four camshaft model has a built-up crankshaft driving bevel gears to the camshafts. Although having only one type of chassis, Porsche has 15 different models or body styles available. Modifications this year are 15 in. wheels, changes in the rubber mounting of the power plant, a new stabilizer, vertical shock absorbers and a hydraulic damper on the steering gear. The windshield covers more area, the seats are two in. lower, and the instrument panel is padded.

B. M. W. (Bayerische Motoren Werke) of Munich came into the highest priced German class with four basic models. Two of them have six cylinder vertical engines and two have V-8's. The two V-8's available are

128 and 195 cu in. and are practically of the same design. The smaller V-8 engine has a bore of 2.91 in. and the larger one has a 3.23 in. bore. The B. M. W. engines are all light-alloy construction with cylinder liners and have the Langerer & Reich oil cooler set in the cylinder casting. The four-speed ZF synchromesh transmission is separate from the engine, except on the 507 sports model which has a five-speed gearbox in unit with the engine. B. M. W. models have a full width tubular chassis frame, the side rails being practically oval section and the cross members circular. Suspension is through long longitudinal torsion bars. Front wheels are independently sprung.

Outstanding in the Ford program was the adoption of the two-stroke List loop scavenged engine. Of Austiran origin, the List engine is at present built in England by the Turner Co. The Ford program provides for two types, a V-4 and a V-6, both having a bore and stroke of 3.62 by 4.14 in., the



Six-cylinder, loop scavenged two-strake engine for use in German Ford trucks



Maico-Champion, one of the new German miniature cars

former developing 80 hp and the latter 120 hp. These engines will be used respectively in the $2\frac{1}{2}$ and $3\frac{1}{2}$ ton trucks. The passenger cars, the Taunus 12M and the Taunus 15M, showed only minor changes. In addition to the German-built models, Ford displayed cars from the English and French factories, Antwerpassembled American models and cars imported direct from the United States.

Opel (General Motors) displayed its two passenger car models, the Olympia with an increased power rating of 45 hp and the Kapitan with power increased to 75 hp. These two cars are in production at the rate of 520 and 180 respectively per day. All General Motors models were on display, coming either direct from the United States or from the assembly plants at Antwerp.

No German automatic transmissions were on display. Zahnradfabrik, of Friedrichshafen, however, exhibited the Hydromedia semi-automatic transmission for use on buses. The two models now in production have torque ratings of 320 and 470 ft lb respectively. In this design there is a three-speed countershaft gearbox with three pairs of gears and three clutches. A hydraulic torque converter is installed in front of the mechanical transmission in such a way that it is only operative for the first gear. The second and third gears are connected directly to the crankshaft and transmit torque without resort to the converter. After initial acceleration through the converter, the driver changes into second and the transmission becomes purely mechanical. With the exception of the dog for reverse, all gear changes are made through friction clutches. They are engaged by oil pressure controlled by an electrohydraulic system.

A feature of the German show was the number of small four-passenger automobiles with engines (usually two stroke) running from about 30 to 50 cu in. One of the most popular of these is the Auto Union DKW which has had its wheelbase extended by four inches to 96 in. and which is the only one in this class fitted with four doors. The DKW has a three-cylinder, two-stroke, 32 hp watercooled engine of 54 cu in. mounted in front, ahead of the radiator, and driving the front wheels through a four-speed synchromesh gearbox. Curb weight of the vehicle is 1900 lb.

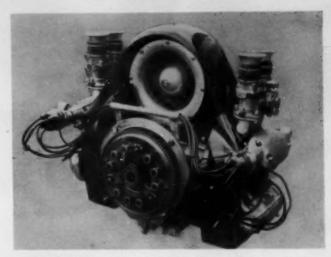
Coming into the same class is a four-passenger two-door model Goliath. This Borgward subsidiary presented a new twin-cylinder, two-stroke engine of 54.9 cu in. displacement, making use of Bosch fuel injection. In this car the engine is mounted transversely, the power being taken to the front wheels through a four-speed transmission. With a compression ratio of 7.7 to 1, the output of the water-cooled engine is 40 hp. A smaller model, on the same general lines, but on which fuel injection is optional, has a piston displacement of 41.8 cu in.

A third big maker of small cars is Lloyd, who this year introduced an aircooled, four-stroke twin of 36.6 cu in. mounted transversely across the front of the chassis. The side-by-side cylinders are inclined forward, with the cylinder barrels shrouded and cooled by a positively driven fan. It has front wheel drive through a four-speed transmission. Body styles are sedan and convertible and a six passenger bus.

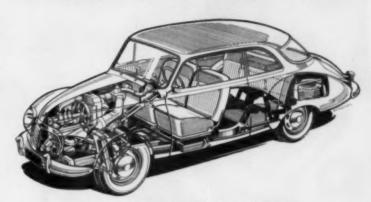
There is a movement in Europe to bridge the gap between the motorcycle or scooter and the orthodox four wheel automobile. One of the most powerful industrial organizations in Italy, with Fiat as one of its leaders, is working on a simplified car of this type. At the Frankfort show there were four different makes of very small four-wheel, two and four passenger automobiles with engines ranging in size from 12 to 24 cu in.

One such car exhibited was the Messerschmit three-wheel scooter which has a pressed-steel, pan-type frame. The one rear wheel is driven through an enclosed chain from a Sachs single-cylinder aircooled engine. Passengers are in tandem and are given the protection of a closed car by a one-piece horizontally hinged top. B. M. W., a firm having an important motorcycle organization, also presented a closed scooter.

Representative of this very small car class was the Maico-Champion which features a central tube chassis frame



Porsche flat four with overhead comshaft and dual carburetors

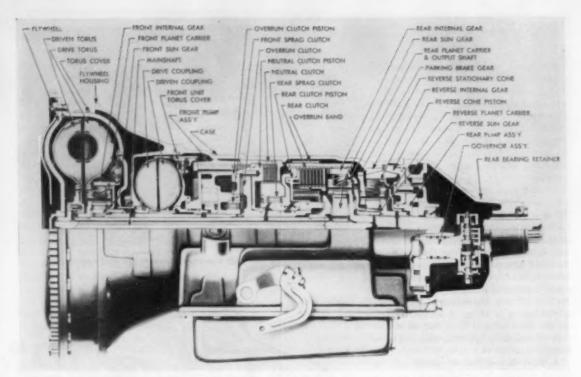


DKW three-cylinder, two-stroke front-drive model



Messerschmit three-wheel closed sceeter

and two welded channel section cross members carrying a twodoor pressed steel body. The engine, a twin cylinder watercooled, two-stroke of 24 cu in. displacement, is mounted on the rear of the central tube and (Turn to page 132, please)



Here is a cross-sectional view of the new Hydra-Matic transmission. The unit now is built as a self-contained assembly together with the flywheel. The main fluid coupling is at the extreme left, the new dump-and-fill coupling is directly to the right. Note the new arrangement of the rear pump and gevernor drive, accessible for removel by disconnecting the rear bearing rotainer. The unit shown is a Strate-Flight Hydra-Matic for a 1956 Pontiac.

Entirely New Hydra-Matic Drive Has Two

Fluid Couplings

The long awaited Hydra-Matic transmission of advanced design makes its first appearance on 1956 cars. Although it represents a redesign so extensive that there is no interchangeability of major components with the former drive, the new Hydra-Matic retains the basic characteristics such as use of a fluid coupling, employment of three planetary gear sets, utilization of four forward gear steps and reverse, as well as dual range. Also, the unit retains its original characteristic of dividing power flow between fluid and mechancial drive—about % fluid.

Beyond this the resemblance between the old and

the new disappears. For in this new drive the Detroit Transmission Division has developed an entirely fresh arrangement of elements, providing smoothness with a complete absence of shock or sense of transition from one speed range to another even in the kickdown maneuver. Much of the complexity of mechanism has been eliminated by the use of one-way sprag clutches that replace the bands and associated servo mechanism for the first two planetary gear sets, thus reducing the number of parts involved.

Maintenance procedures have been greatly simplified in many ways. For one thing, band adjustments are a thing of the past, since only one band now remains. The entire drive now is manufactured as a complete package, including the fluid coupling and flywheel ring gear, and is installed as a unit. Incident to this change, the drive is coupled to the flywheel through a single flex plate using only four or six studs for attachment, making replacement of the drive a very simple matter.

With an eye to future styling requirements, the valve body has been mounted on the under side of the case, making it readily accessible for servicing simply by removing the oil pan. At the same time, the transverse cross section of the case has been slimmed by sloping the sides from the top to provide ample clearance for lowered floor pans. In addition, there is an appreciable reduction in weight with the introduction of an aluminum bell housing and rear bearing retainer.

The rear pump and governor drive are entirely new, mounted at the extreme rear end to permit access for servicing by removal of the rear bearing retainer. One other noteworthy feature is the addition of a mechanical parking mechanism. Incidentally, the new Hydra-Matic now has provision for oil cooling.

Incident to these features, the gear selector positions now are as follows: "P"—park, "N"—neutral, "H-S"—for dual drive, "L"—low, and "R"—reverse. Engine starts can be made either in park or neutral positions.

All of the features incorporated in the new drive stem from the objectives of complete smoothness of operation and highest possible efficiency without sacrificing any of the basic features associated with Hydra-Matic drive. The new transmission represents over 2-million miles of road testing, over 1½-million miles with the final production design. This, together with experimental testing in the laboratory and on dynamometers during the program, enabled the Division to place the drive in mass production with complete confidence.

The principal cross-section, reproduced here, shows the general arrangement of major components and highlights the major differences as compared with the former design. While the unit still has three planetary gear sets, the front planetary now is mounted within the main fluid coupling. Key to operational smoothness is found in the introduction of a small coupling, mounted on a one-way sprag type clutch, controlled by

the valving which may be seen directly to right of the coupling. Termed a dump-and-fill type clutch member, the coupling fills with fluid whenever the signal calls for a lock-up of the front unit giving a direct drive and it dumps the fluid when torque multiplication is required and the reaction is grounded through the sprag clutch, both maneuvers being accomplished with extraordinary rapidity.

Shifts are completely automatic and vary with car speed and accelerator linkage position.

The small fluid coupling replaces the front unit clutch. One band with a simple servo has been retained for use only when the transmission is in low range to eliminate free wheeling during overrun conditions.

The inherent smoothness of fill and dump characteristics of the small fluid coupling makes it unnecessary to employ a complicated servo mechanism for timing. It obviates mis-timed shifts, eliminates the possibility of fight between communicating members and prevents rapid changes or fluctuations in output torque. Moreover, the smoothness of 4-to-3 speed part throttle transition makes it possible to take full advantage of high performance characteristics to effect part throttle downshifts in this range at speeds up to 33 mph. Full throttle downshift in the same range also is available but is effected with extreme smoothness.

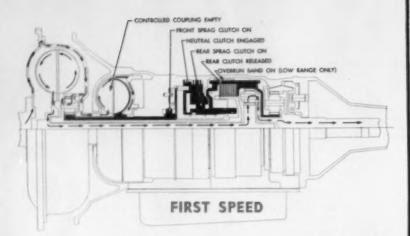
Gear noise is greatly reduced, largely through the location of the front unit directly behind the large torus assembly where it is submerged in oil. The change in drive for the rear pump and governor also reduces noise level materially.

Power flow for first, second, third, fourth, and reverse is shown on the accompanying page. In neutral, the front unit sprag is on, the front coupling is empty, neutral clutch is released, and both rear unit sprag and clutch are off. Note diagrams, next page:





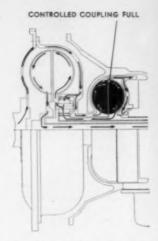
The two torus members of the new front unit coupling in the 1956 Hydra-Matic transmission. On the left is the driven torus and on the right is the drive torus attached to the main shaft. These members are from a 1956 Oldsmobile.



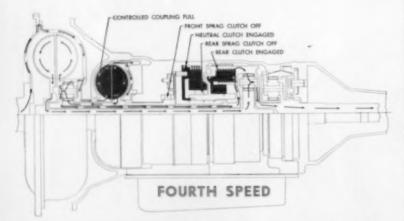
First Speed coupling is empty; neutral clutch is on; the rear unit sprag is on, and the rear unit clutch is off. Power flows mechanically from the flywheel to the torus cover, then to the front unit internal gear. Here power divides, with part directed to drive the front unit driving torus, and since the small coupling is empty, no power is transmitted to its driven torus. Power is also directed from the internal gear to the front unit carrier assembly. Since the center gear is held by the sprag, the pinions move around the center gear is held by the

ter gear with a reduction in speed. The carrier, in turn, is attached to the main drive torus member, thus permitting the driven torus member of the main coupling to drive the connected mainshaft and rear sun gear.

The rear unit sun gear drives the pisions of the rear unit carrier at reduced speed areand its internal gent, since the latter is held by the sprag. Because the carrier at the rear unit is attached to the output shaft, power is then transmitted directly to the output shaft. Total reduction in first speed is 2,946 to 1.



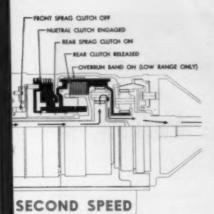
Second Speed Front unit has the sprag off; the small coupling is full; neutral clutch is on; while in the rear unit the sprag is on and rear unit clutch off. Power flows from the flywheel to the torus caver and to the tront internal unit. Here power divides, and the two members of the front unit gear set are locked tegether to provide for direct drive. The planet carrier transmits torque



Fourth Speed In this phase the freat unit is in direct drive with sprag aff, and coupling full; neutral clutch on; rear unit in direct with sprag off, rear unit clutch on. As before, mechanical power divides at the internal gear at the freat placetary, part being directed to the freat coupling. Since the small coupling is filled with all, the driving torus member—attached to the front unit center gear—drives the driven member, thus combining to give direct drive with the planet carrier, at engine speed.

Again power divides, first to drive by fluid the connected mainshaft and rear unit sun gear, the latter driving the pinions of the rear carrier. Power also is applied mechanically to the rear unit through the intermediate shaft, to which is splined the rear clutch hub. Since the rear clutch is applied, power is transmitted mechanically to the rear internal gear and planet pinions where it combines with power transmitted from the fluid connection to the rear sun gear. **Entirely New**

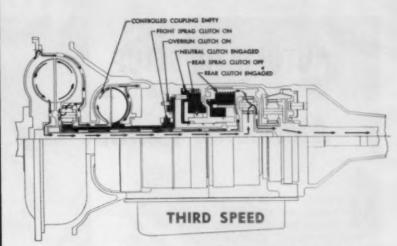
HYDRA TRANS



through the oil medium to the driven torus member and the latter, in turn, drives the connected mainshaft and rear unit sun gear.

rear unit sun gear.

In this maneuver, the rear unit gear
drives the plaions at a reduced speed
around the internal gear which is held
by the sprag. Power then is transmitted from the carrier through the output shaft. The reduction in second
speed is 2.5532 to 1.

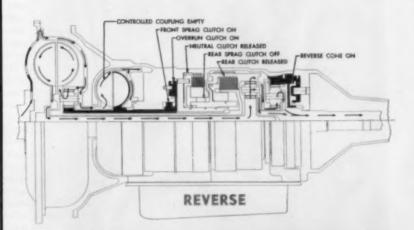


Third Speed
sprag clutch on, and coupling empty;
neutral clutch is on; rear unit is in
direct drive, with sprag off, and rear
unit clutch on. Power flows from the
flywheel to the torus cover and to the
front unit internal gear, then divides
—part to drive the front unit driving
torus, and since the coupling is empty,
no power is transmitted. Power also
is directed from the front internal gear
to the frost carrier assembly. Since
the sprag clutch is on, the pinions move
around center gear with a reduction.

From the front unit power is directed to the rear planetary in two ways; first of all, the main coupling drives the connected mainshaft and rear unit sun gear. In addition, power is directed mechanically from the carrier of the front unit to the rear unit through the latermediate shaft which is spilloed to the main drive terus member. Since the rear unit clutch is applied, power is transmitted through the clutch, drum, and internal gear to the planet pinions where it combines with power from the rear unit sun gear. Reduction here is entirely from front unit—1.5536 to 1.

-MATIC MISSION

... Continued



Reverse All three planetary gear sets are in reduction, with small coupling empty, and sprag on at the front unit; clutch on at the reverse unit; neutral off; and both sprag and clutch off at the reor unit. In this mensurer, the center gear of the front unit is held by the sprag to pravide reduction. Fluid power then is transmitted by the driven torus member

through the mainshaft and roor sun gear. Since the rear spray is released, the sun gear drives the rear internal gear counter-clockwise to produce reverse motion. The internal gear, through a flange, then drives the center gear of the reverse unit and power is transmitted through the reverse planetary carrier to the output shaft. Reduction in reverse is 4.3066 to 1.

AUTOMATIC SETUP

By JOSEPH GESCHELIN

for

Machining Pontiac Engine Valves

ACHINING of intake and exhaust valves for Pontiac V-8 engines has been developed in interesting fashion through employment of an intricate network of automatically controlled materials handling elevators and feeder chutes as well as ingenious loading and unloading devices for automatic cycle machines.

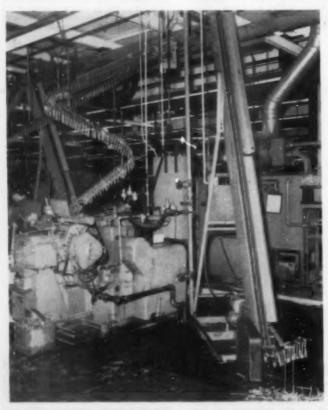
Intake valves, which are received from the vendor in rough machined state, require rough-, semi- and finish-grinding of the stem, semi-finish- and finishgrinding of valve seat, and cutting of two lock grooves at the stem end. Exhaust valves, on the other hand, require only finish centerless grinding of the stem. In view of this, the machining of intake valves has been organized in a compact, self-contained department, designed to complete all operations except the final centerless grinding. As will be described later, the work from this department is transported to another valve department where both intake and exhaust valves are finish ground, washed, inspected and graded,

and transported by automation directly to the cylinder head assembly station.

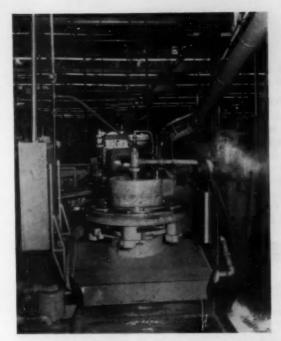
Intake valves, as received from the vendor, are loaded manually into a vibrator magazine and fed to the first of the elevators in this department. All elevators are 14-ft high to provide for excess storage space, except for one 16-ft unit. At the upper end of the first elevator, the feeder chute divides into two sections, each one serving a Cincinnati Centerless grinder for rough-grinding the stem. All of the equipment has provision for automatic loading and unloading. At the unloading end the parts feed from each of the two machines to a common chute for loading the next elevator.

Again the chute from the upper end of the elevator divides to feed work automatically into two Landis valve seat grinders of angular wheel type for rough-grinding the seat. As the valves are ejected from these machines, they move on chutes to the loading end of the next elevator. From here they flow downward to a single Ex-Cell-O grooving machine in which the two grooves are cut automatically. The automation of this machine is rather intriguing since the valves must be loaded automatically into stations on six-spindle, constantly rotating table, and automatically unloaded and directed to the next elevator unit. Needless to say, the entire mechanism for this purpose is skillfully developed and protected by safety devices.

The latter elevator feeds valves to another group of two Cincinnati Centerless



Here are the intele valves moving by automation to feed the Cincinnati Centerless grinder in the foreground. One of the tall elevators, mentioned in the text is seen at the extreme right.





At left—This is the special Ex-Cell-O grooving machine for grooving and chamtering the stem end of intake valves. It has a six-spindle, constantly rotating table and valves are fed automatically into a station from the chute running downward from the right hand corner.

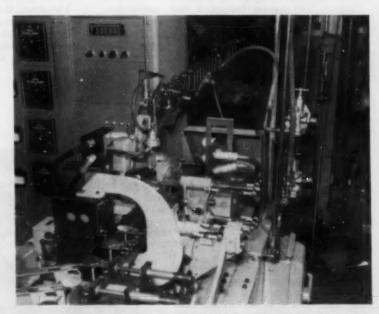
At right—The enormous Gardner double-end grinder seen here grinds both ends of intuke valves to proper length in an automatic cycle. Valves are fed to the work station by the gravity chute overhead, leading into the machine station. Finished work comes out on the chute at the bottom and the valves than are moved upward by the elevator at the left for distribution to the next operation.

grinders for semi-finish grinding of the stem, and again the unloading station delivers them to an elevator. This one, in turn, distributes the valves to a group of two Landis grinders for finish-grinding the valve seat.

Valves coming out of the latter operation feed another elevator which, in turn, communicates with the loading magazine of a large Gardner, double-end, surface grinder. The grinder magazine is arranged to load valves automatically into the large diameter trunnion fixture. In this operation the head and stem tip are ground to required length.

Valves are unloaded automatically out of the Gardner grinder, move to the loading station of another elevator and are fed directly to a wire brushing machine for removing burrs incident to the end grinding operation. Leaving the wire brush, the valves remain on the hori-

(Turn to page 110, please)



At the end of the finish-grinding department, valves are directed by gravity chute, leading from the right, and are automatically inspected in the special Federal gaging machine seen in this view. While inspecting at high speed, the machine serts stem diameters, checks length and run-out. Similar machines are used for intoke and exhaust valves.

NEW CLIPPER ENGINES

Condensed Specifications

ENGINE	CLIPPER CUSTOM	CLIPPER SUPER &
Туре		V-8 Valve-in-Head
Torque	380 lb ft @ 2800 rpm.	350 lb ft @ 2800 rpm
Brake Horsepower	275 @ 4600 rpm.	240 @ 4800 rpm.
Displacement	352 cu in.	352 cu in.
Bore	4 in.	4 in.
Stroke	31/2 in.	31/2 in.
Compression Ratio	9.5 to 1	9.5 to 1
Bearings	5	5
Oil Capacity	5 qt	5 et
Carburetor	Four-Barrel	Two-Barrel

Two new, large displacement V-8 engines power the new 1956 lines of Clipper cars.

Clipper Custom models are powered by a 275-hp V-8 engine of 352 cu-in. displacement with a torque rating of 380 lb ft at 2800 rpm. Clipper Super and Deluxe models are powered by a 240-hp V-8 of 352 cu-in. displacement with a

torque rating of 350 lb ft at 2800 rpm. Both V-8 engines have a 9.5 to 1 compression ratio.

Clipper V-8 engines feature a new combustion chamber and use a new type "long reach" spark plug. The plug electrodes extend farther out into the gas stream. The 1956 models feature new grilles, new hood and new hood lines, new rear decks and new taillights.

Parking and directional signal lights have been styled into the headlight assembly. There is a massive, new vertical bar grille. Newly-styled rear bumpers accommodate dual exhaust outlets. Overall length of the new Clipper is 215 in.

Torsion bar suspension of the type pioneered by Packard for the high price field on 1955 models, and continued with refinements for 1956, is standard equipment on the new Clippers.

Electric push-button control of the Ultramatic transmission is a feature for 1956. This new control is similar to that on the 1956 Packard luxury cars.

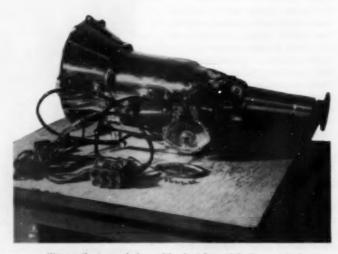
Mounted at the base of the steering column is a unit consisting of a composition rubber diaphragm supported by steel disks, splined to separate pieces of the steering column. With the new flexible coupling in the steering column, impulses which might otherwise normally be transmitted to the steering wheel, are Torsion Bar



Clipper Deluxe series sedan

absorbed by the rubber diaphragm, and isolated from the passenger area.

The steel disks which support the rubber diaphragm are designed in such a manner as to form a rigid steel coupling for the transmittal of steering control even if the diaphragm should be torn or damaged. The new absorbing unit is standard equipment.



Ultramatic transmission with electric push-button control

Suspension Standard on 1956 Clipper Models



Clipper Super series Pasama hardtop

In all cars with power steering, a new overall ratio has been incorporated which gives faster steering with fewer wheel turns. The number of turns from lock-to-lock has been changed from approximately 4.2 to 3.8, or a decrease of about 10 per cent of wheel turning for the same maneuvering of the cars. Power steering is optional on all models.

A revised shift pattern in the new Ultramatic transmission permits higher car speeds in low gear. There are two "kick-down" ranges which will provide a burst of power for any driving range from 20 mph and up.

A rear axle with a ratio of 2.87 to 1 is used on cars equipped with Ultramatic transmission. In addition, overdrive and standard transmissions are available.

British Ford Makes Transfer Of Assembly of Popular Car

British Ford has transferred assembly of the low-priced Popular to the Briggs plant at Doncaster, 160 miles north of London. This production switch, costing \$500,000, is part of Ford's \$170 million expansion program. The move was made without interrupting deliveries or affecting existing contracts.

Work at Doncaster includes making the body and all upholstery and interior trim. The engine, transmission, axle assemblies, and other mechanical parts are shipped by rail from the main factory at Dagenham. Current output is 100 to 120 cars a day.

Floor space released at Dagenham will make possible increased production there of Anglias, Prefects, and Thames %-ton panel vans. Demand for these vehicles in both the British and export markets continues to outstrip their availability.

Mexico Is Anticipating Good Automotive Future

Within two years Mexico will be producing economical passenger cars, according to Manuel Palavicini, head of the Industria Automotriz de Irolo. This is the Fiat plant which now represents an investment of about \$40 million.

The plant will also produce trucks, buses, and tractors. The most important division, however, will be that devoted to passenger cars, however.

Retail price of the four-door standard model will be about \$1120. The de luxe model is expected to sell for approximately \$2000.

ISC to Quiet Jet Test Cells At Univ. of Mich. Laboratory

Industrial Sound Control, Inc., Hartford, Conn., has been assigned the responsibility of silencing three jet engine test cells in the new Automotive Laboratory being erected at the University of Mich. at Ann Arbor.

The cells will be utilized for both instruction and research on gas turbines. Component testing and research involving compressors, turbines, and combustion chambers will be conducted in one test cell.

Another will be fitted as a thrust stand for jet engine work. The third cell will be equipped with dynamometers for gas turbines and will be used for checking power take-offs, testing turboprops, etc.

AUTOMATIC TRANSMISSION PARTS

Balanced in Fully Automatic Setup

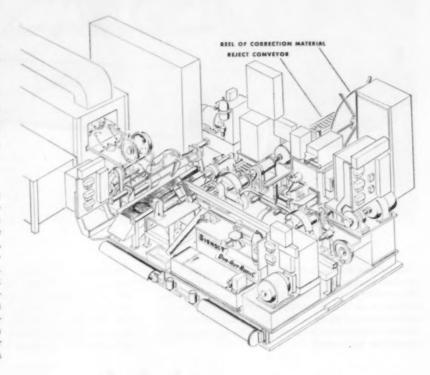
HEN it comes to balancing operations, Gisholt Machine Co., Madison, Wisc., needs no introduction to readers of AUTOMOTIVE INDUSTRIES. In fact, pointed examples of Dynetric balancing equipment for complete engine balance are still fresh in the descriptions of current V-8 engine plants.

The latest step forward comes with the announcement of a new concept in balancing techniques — the Dyn-Aut-Ronic equipment, providing complete automaticity without an operator. It is so broad in concept as to permit automatic balancing of a variety of parts on a single station machine; or on a multi-station machine having two or three times the rate of a single station machine.

The process normally includes three major steps: location and measurement of the amount of correction; making the correction at the proper location; and final inspection. While this is the basic procedure, Gisholt already has produced equipment for certain mass production applications to include automatic handling of work into and out of the machine, the final step after inspection being that of rejection or unloading.

Perhaps the best example of the scope of this technique is found in the development of an extensive horizontal machine in which the balancing section represents but a small part of the whole. This is a complex transfer machine designed for the preparation and balancing of the torus sub-assembly for the new 1956 Hydra-Matic automatic transmission described elsewhere in this issue, starting on page 62.

As illustrated, the load position corresponds with the unload position of the preceding transfer line. The work is transferred automatically along the stations described below, at the rate of 180 pieces an hour. Here are the major stages along this machine:



 Oil fill—Here the cavity of the sub-assembly is partially filled with oil. Because it is not entirely machined inside, there is some eccentricity of the cavity with respect to its axis. Since the cavity normally contains oil, the part is balanced under normal operating conditions.

2. Measure unbalance—At this station, the work is mounted on an expanding mandrel and rotated at 1000 rpm to determine the amount and location of unbalance. When unbalance has been determined, rotation is stopped and the work is indexed to a location which will insure that correction is applied in the proper position at the next station.

3. Apply correction—Correction is applied by spot welding onto the periphery of the assembly a length of 14 gauge strip, one inch wide. While unbalance was being measured in Station 2, the length of correction strip was being unrolled from a reel, straightened and formed to a radius corresponding to the arc of the assembly, and cut to a length proportional to the

(Turn to page 122, please)



Oldsmobile for 1956 Features New Hydra-Matic Drive

M ORE powerful engines, a new Hydra-Matic transmission, and styling improvements are among Oldsmobile's offerings for '56. Appearance changes include a new grille, hood and ornamentation, redesigned bumpers, both front and rear, new flair-away fenders and restyled projectile-type tail lights.

Horsepower is raised to 240 in the Rocket T-350 engine which powers the 98 and Super 88 cars. The T-350 designation indicates 350 lb-ft of torque at an engine speed of 2800 rpm. Compression ratio is 9.25 to 1 in all 1956 Rocket engines. The 1956 Series 88 Rocket has a larger dual carburetor and develops 230 hp.

Three series of cars in 13 body types are offered by Oldsmobile for 1956. There are four Fisher body types in the luxurious 98 series—four-door Holiday sedan, Holiday coupe, four-door sedan and Starfire convertible. The high performance Super 88 series presents the Holiday sedan, Holiday coupe, two-door sedan, convertible coupe and four-door sedan. In the 88 series are the Holiday sedan, two-door sedan, four-door sedan and Holiday coupe.

Jetaway Hydra-Matic Drive, which is making its bow in the 1956 Oldsmobile, will be standard equipment on the Super 88 and 98 series. Hydra-Matic Drive is optional at extra cost on the 88 series. The Jetaway Hydra-Matic introduces a new second fluid coupling in the drive train that blends the changes in the gear ratios into a single continuous flow of power.

CONDENSED SPECIFICATIONS OF OLDSMOBILE 1956 MODELS

	88 Series	Super 86	96 Series
Wheelbase (in.)	122	122	126
Overall Length (in.)	200.29	203.29	212.20
Overall Width (in.)	77.0	77.0	77.6
Number of cylinders	8	8	1
Bore and stroke (in.)	31/4 x 31/4a	31/4 x 31/4a	3% x 3%s
Compression ratio	0.25:1	9.25:1	9.25:1
Piston displacement (ou in.)	334	224	324
Maximum brake hersepower.	230 @ 4400 rpm	240 @ 4400 rpm	249 @ 4400 Fpm
Maximum torque (lb ft).	340 @ 2400 rpm	380 @ 2800 rpm	390 (6. 2000 Fpm



New mechanical gear shift indicator is at base of the instrument cluster, which also includes speedometer, fuel gage and safety lights for ammeter, oil pressure and water temperature

Shifts are smoother than ever before. As an added convenience, a parking lock operated with the shift lever is incorporated in the transmission. See description of the new Hydra-Matic transmission starting on

(Turn to page 120, please)



AUTOMATIC CONTROLS

By Paul Kennedy

FASTER HANDLING

Mechanical automation of a high order is developed by a number of specialty firms. One of the leaders in this field is Hautau Engineering Co., which came up with interesting attachments for several

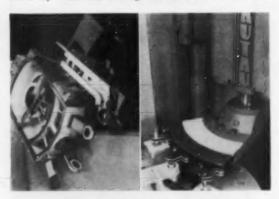


FIG. I

FIG. 2

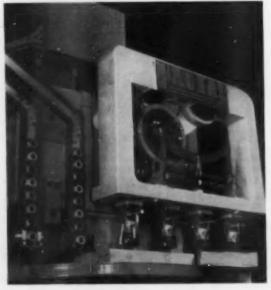


FIG. 1

machines at the Machine Tool Show. (See AI, Oct. 1, page 60.) Although the devices shown here are custom designed for a certain part on a particular machine, with specific input and output requirements, still they are all operated by a standard mechanism (not shown). This mechanism provides the following motions: clamp the workpiece, clear it from its holding fixture, move it to the work fixture, insert it into work fixture and unclamp, and move out of the way.

Fig. 1 shows a loader for bearing races on an eightspindle New Britain automatic. After the first operation, the loader removes the workpiece from one chuck, rotates it 180 deg and places it in a second chuck for further work. Fig. 2 is a picture of a loader used to move valves between two cavities of a forge press. Fig. 3 shows a loader for two shoulder bushings on a two-spindle New Britain boring machine. Fig. 4 shows details of a swing-arm loader handling pistons on a Norton grinder. Cycle time to load and unload is two seconds.

AUTOMATION EXPOSITION

Three clinics—on electronic computers, conveyor automation and laboratory automation—will be important features of the second International Automation Exposition at Chicago's Navy Pier, Nov. 14-17. In addition, over one hundred exhibitors will show electronic, hydraulic, pneumatic and mechanical automation products of every description.

TAPE-CONTROLLED MILLER

Bendix Aviation Corp. has revealed a few details of a unique milling machine it devised to make cams for jet engine fuel metering. Coded dimensional information is punched onto paper tape, which is in turn read by a computer and used to instruct the servomechanisms and the tool, also developed by Bendix. The machine has been used in production for almost a year, said Dr. A. C. Hall, director of the firm's Research Laboratories. It does in two to four hours a (Turn to page 134, please)



FIG. 4





Specialists for over 37 Years in FLUID FLOW



VIBRATION PROBLEMS



Schwitzer has extensive Research and Engineering facilities and experienced technicians to develop an economical product—for the Flow of Air, Oil, Water and other Fluids—or the Isolation or Elimination of Vibration in your equipment, whether it is in the Automotive, Atomic, Aircraft, Agricultural, Earth Moving, or other fields.



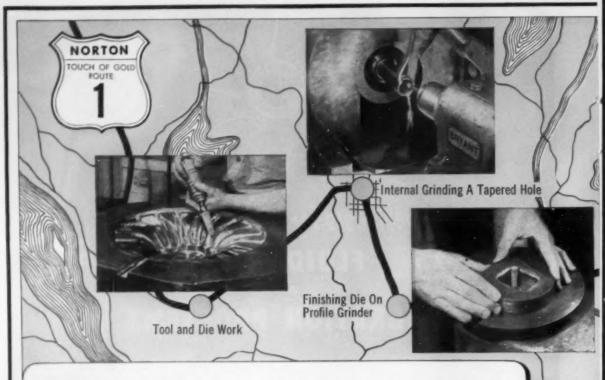


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YOUR "TOUCH of GOLD" ROAD MAP TO HARD-TO-REACH GRINDING SPOTS

NORTON MOUNTED WHEELS AND POINTS

bring you big savings on hundreds of small grinding jobs

Norton mounted wheels and points bring the same "Touch of Gold" grinding performance to small or hard-to-get-at areas that the big Norton wheels deliver in the "wide open spaces." Which means that every time you put one to work you get better grinding for less money. Here are some reasons why:

- Norton mounted wheels and points stay on their spindles—stay on TIGHT, under severest use. Norton-developed mounting techniques make sure of this.
- They're trued on their own spindles, which assures: (1) perfect concentricity; (2) sharpness and fast-cutting action; (3) accuracy of dimensions and shape. They're ready to go to work immediately.
- They're duplicated identically from lot to lot, thanks to Norton's statistical quality control in processing.

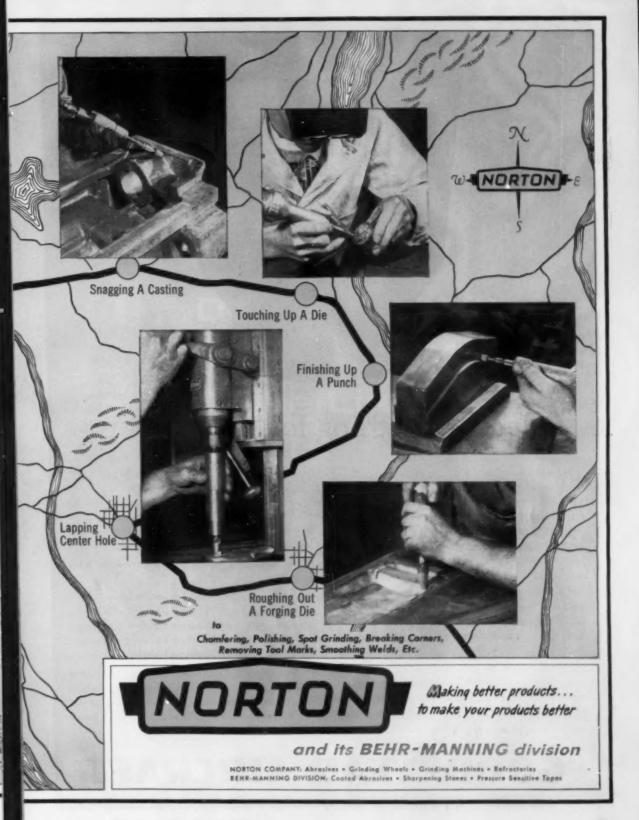
They're a 100% complete line, for grinding all metals and many other materials . . . made in nearly 200 standard shapes and sizes . . . in the famous ALUNDUM° and CRYSTOLON° abrasives, vitrified or resinoid bonded . . . in diamond abrasives, metal or resinoid bonded . . . and in the laminated, semi-flexible BF construction, resinoid bonded. For ultra-high speed precision grinding, special spindles and cement are available.

Your Norton Distributor

can help you plan your profit-boosting "Touch of Gold" Route to hard-to-reach grinding spots. See him for the mounted wheels and points you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

*Trade-Marks Reg. U. S. Pat. Off, and Fareign Countries

W-1649





Here's something for the hopper

RARMERS have long been hampered by the problem of corrosion which occurs in metal fertilizer hoppers. The farm implement companies and Goodyear Aircraft Corporation teamed together to supply the answer—rust-free, corrosionproof hoppers built of specially engineered structural plastic.

And in the doing, another application was added to the growing list of mass-produced products which are benefiting handsomely by the use of new structural materials—pioneered by Goodyear Aircraft to meet special stamina needs in the construction of American air power.

These new engineered structural plastics first proved their extreme durability and strength on airships and airplanes—indeed "acid tests" for toughness.

Equally important is the ease in which these new aircraft-type plastics can be one-piece molded in

quantity—in units over 15 feet in length involving difficult double-contour shapes. This can spell real economy for manufacturers seeking to integrate their

designs and eliminate extra parts, assembly tools, dies and jigs.

The durability is spectacular; and you can have molded-in colors.

This structural plastics success of Goodyear Aircraft is "something for the hopper" all right—something designers and manufacturers throughout industry are confidently placing in the pot which brews tomorrow's best-dressed products and sleekest motorcars.

The experience and vast plastics molding facilities of Goodyear Aircraft—including presses up to 700-ton capacity and platen sizes of 15 feet—can serve you well. Why not get the facts? Write: Goodyear Aircraft Corporation, Dept. 9311K, Akron 15, Ohio.

GOOD YEAR AIRCRAFT

New Materials and Methods for Industry—the result of aeronautical pioneering

EATONITE VALVE SEAT INSERTS







EATON
Zero-Lash
HYDRAULIC
VALVE LIFTERS

5 Eaton Developments that Increase Valve Life



FREE-VALVES



SODIUM-COOLED VALVES

EATONITE-FACED VALVES

EATON

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ANUFACTURING COMPANI

PRODUCTS: Sodium Cooled, Poppet, and Free Valves - Tappets - Hydraulic Valve Lifters - Valve Seat laserts - Jet Engine Parts - Rotor Pumps - Motor Truck Axles - Permanent Mold Gray Iron Castings - Heater Defraster Units - Snap Rings Springtites - Spring Washers - Cold Drawn Steel - Stampings - Leaf and Cail Springs - Dynamatic Drives, Binakes, Dynamameters

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OSTUCO Welded Tubing offers design engineers unlimited latitude to creete a variety of original but practical product designs.



Sales Managers can meet . . . and best the competition with products in-corporating OSTUCO Welded Tubing.



Cost Control is easier with OSTUCO Welded Tubing. Low initial cost and less time-consuming processing mean important savings,



Extra strength, less weight, and unifermity of OSTUCO tube walls insures top quality finished products time after time. No rojects here.



Production runs smoother ... faster with OSTUCO Welded Tubing components. Assembly time is reduced, expensive operations eliminated. Production schedules are on time.



OSTUCO's single-source service design (manufacturing and fabricating under one roof) means error-free handling of every order—large or small. Purchasing can relax . . . less follow-up necessary with OSTUCO.



SEAMLESS AND ELECTRIC WELDED STEEL TUBING -Fabricating and Forging

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CANADA, RAILWAY & POWER ENGR. CORP., LTD.

EXPORT: COPPERWELD STEEL INTERNATIONAL COMPANY

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Use of Huge Abrasive Belt Grinding Machine Made Available to Manufacturers Who Wish to Explore Possibility of Using Such Equipment.

Shiny Aluminum

A bright anodized aluminum finishing method just introduced by Doehler-Jarvis is said to be an almost exact match in brilliance and color to chrome. Some of the material finished by this new anedizing process is already replacing chrome plated grilles and other body trim for 1956 automobiles. Also, with this aluminum finish it is possible to make the parts in various colors. Any aluminum part can be bright anodized regardless of the forming method—stamped, forged, drawn or extruded.

Three Hp Per Inch

The Coated Abrasives Div. of the Carborundum Co. has installed an 80 ton abrasive belt grinding machine which uses 250 hp to drive an 88 in. wide waterproof abrasive cloth belt. Company officials claim that the machine is the largest in the world and will be taking on such work as 40 ft long aluminum wing skins. Cost of the massive unit, which was built by the Farnham Div. of Weisner-Rapp Co., was somewhere in the neighborhood of a quarter of a million dollars.

Carborundum has instituted a surface grinding service to explore the possibility of using it for a wide variety of industrial application. The management has extended an invitation to members of the automotive industries who might possibly utilize flexible wide belt grinding to send sample lots for test runs. Carborundum will then make out a confidential report on each test run made for the guidance of the particular company sending in its products. The machine will handle workpieces up to 40 ft long, 86 in. wide, and a foot thick.

One of the features of this surface grinding machine is that a taper can be reproduced by moving the traveling head vertically as it traverses the length of the workpiece, which is mounted on a fixed vacuum chuck table. A tracer mechanism, hydraulically operated, controls the movement of the grinding head. Simple tapers may be dialed into a universal taper mechanism mounted in one column of the head. Complex tapers

are reproduced by means of a master template. Another method which may be used to produce a taper is designed into the fixed vacuum chucked table. This table is composed of individual sections which may be tilted from side to side and locked in place with production shims. Therefore, this tilting table feature may be combined with either of the aforementioned tapering methods for the production of compound surfaces. Tolerances with the machine are better than ±0.005 in.

Chromium Carbide Brazed

A new technique has recently been developed that will provide an additional market for cemented chromium carbides which are used for applications in the 600 F range. Work by the Carboloy Dept. of General Electric, in co-operation with Handy & Harman, has provided a procedure for brazing cemented chromium carbide with silver alloy filler metals. In the automotive industries this material may be used for valve components, extrusion nozzles, gage blocks, high speed instrument bearings, and other applications where corrosion, abrasion and oxidation resistance at elevated temperatures is required. The new method worked out with Carboloy grade 608 is based on the use of a brazing flux containing powdered boron. Boron, being a strong reducing agent, dissolves the characteristically tough chromium oxide film encountered in chromium carbides

Automation and the Job

The Council for Technological Advancement has brought out another study, "Automation and Job Trends," which tells us that the dynamic flow of labor from one industry to another is essential if the full benefits of automation are to be realized. The theme of this pamphlet is that flexibility is essential. Some years ago, approximately half of the U. S. labor source was needed on farms. Today, only about 10 per cent is engaged in agriculture, although the population has increased by more than 50 per cent. Mechanization and its ally, auto-

mation, has made this possible. We would like to recommend writing to CTA, 120 S. LaSalle St., Chicago, for a copy of this new book.

Machine Tool Awards

Dr. Max Kronenberg, Consulting Engineer, Cincinnati, Ohio; Paul Maker and Edward Dix, Senior Research Engineer and Project and Design Engineer with Bryant Chucking Grinder Co., Springfield, Vt., shared the \$3000 first award in the recent \$12,000 Machine Tool Design Award Program sponsored by The James F. Lincoln Arc Welding Foundation of Cleveland, Ohio. The award was made for a paper they wrote describing development work on vibration and rigidity undertaken in designing a new internal grinding machine with welded steel construction.

The new internal grinder was developed by the Bryant Co. to create a machine that would hold closer tolerances at higher speeds than conventional grinders, by increasing rigidity and freedom from vibration through welded construction. The production machine developed is claimed to give a saving in grinding time of 50 per cent, a much better finish and much better control of dimensional variation. In addition, costs were reduced 43 per cent and weight, 26 per cent.

Leonard McDermott and Richard Fleury, foreman and stylist for the Brown and Sharpe Manufacturing Co., shared the \$2500 second place award. They wrote a paper describing successive redesigns of a grinder base which has changed from a design in steel that simply copied a casting to a steel design which was tailored to take full advantage of the economies of welded fabrication techniques. A saving of 37 per cent resulted.

George Kasselmann, design engineer with the R. K. LeBlond Machine Tool Co., received the program's third award of \$2000. His paper described a 36 ft long template carrier rail of a roll-turning lathe, which, by welding, was increased in rigidity so that straightness tolerances were maintained even though weight was reduced from 7000 lb to 3000 lb. Cost savings were 37 per cent.



PRODUCTION EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Openside Shaper-Planer



Rockford openside shaper-planer

HEAVY-DUTY openside hydraulic shaper-planers are being built in 30 by 24, 30 by 30, 36 by 36 and 36 by 42 in. table sizes with stroke lengths from six to 20 ft. The machine is equipped with the firm's new hydraulic triple circuit, to provide the correct combination of cutting speed and required force to economically machine materials from free cutting types to the toughest steels. Three cutting ranges are provided. Infinite speeds range from 10 to 300 fpm with maximum return speed regardless of cutting speed.

The machine has a heavy column with a long joint face for attaching to the bed. The cross rail is wide and

deep and it has a large bearing surface on the column ways. Rugged tool heads with a vertical feed engagement permit better control by the operator. The tool head saddles, as well as the vertical feed slides, are equipped with adjustable double nuts, designed to eliminate backlash and make it simpler for the operator to set up jobs. All tool heads have an inside clapper block arrangement and a positive abutment to take the thrust of the cut. For greater convenience when finish planing with a broad nose tool, maximum cross feed and vertical feed to all heads is 0.500 in. Rockford Machine Tool Co.

Circle 40 on postcard for more data

Shaft Synchro

The Shaft Position Quantizer with its control unit provides a standard shaft-position-to-digital converter system. The device has no gears or digitizing commutators. Designed as a standard package, it is adaptable to any shaft. It is said to be suitable for applications where a high degree of accuracy along with instantaneous shaft position indication is required.

An external command pulse initiates a shaft position reading. The output count is an exact measure of the shaft position at the instant of the command pulse. Manual or automatic command pulses may occur at regular or irregular intervals up to 20 readings per second. However, using special techniques, literally thousands of readings per second may be taken. The total count is accurate to plus or minus one count (six minutes of arc) for any position of the shaft and is guaranteed whether the data shaft is stationary or turning at up to 240 rpm. Special Devices Div., Austin Co.

Circle 41 on postcard for more data

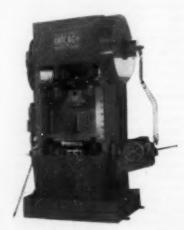
Spray Booth

Semi-elevated water wash paint spray booths are designed specifically for all production spraying. The wash chamber section is elevated above the dry section of the booth. A heavy downflow of water falling on the back wash curtain creates a filtering point of entry through which all paint particles must attempt passage before reaching the principal wash action process of the water chamber section. Through this process, much of the paint residue is knocked down and safely contained within the water reservoir tank. M & E Manufacturing Co.

Circle 42 on postcard for more data

Stamps Chain

A 110-TON capacity press is producing No. 55 detachable link sprocket chain automatically at 120 strokes per minute. The press features



D&K model \$04-D\$\$ "Chicago" press

a five-in. power adjustment of the ram, 12%-in. die space, 18 by 33-in. ram area, Wichita air clutch and brake. Material is 1-9/32 by 0.125-in. hot rolled, pickled and oiled strip of Re 75 to 90. Dreis & Krump Mfg. Co.

Circle 48 on postcard for more data

Limit Switch

Control of two independent circuits is provided in a small heavy-duty limit switch announced recently. Designated the 1LS1, it features sealed construction and high electrical capacity plus adjustability. This makes it suitable for a wide range of industrial applications where space is limited. Seals on the actuator shaft and between the cover plate and the enclosure prevent entry of foreign matter into the switching chamber.

The switch is equipped with a roller-arm actuator which can be adjusted through 360 deg with positive locking in any position. Actuation can be clockwise, counter-clockwise or in both directions. The actuator head may be removed and faced at any of four positions at 90-deg angles. Micro Switch, Div. of Minneapolis-Honeywell Regulator Co.

Circle 44 on postcard for more data

Drilling Machine

THE H-6 light sensitive adjustable, multi-spindle driller and tapper with a three-position automatic fixture slide is designed to drill, chamfer and tap holes automatically. A typical feed cycle is as follows: Position No. 1, drill: load part; rapid traverse;



Natco three-way drilling machine

feed forward, rapid reverse; index. Position No. 2, chamfer: rapid traverse; feed forward; rapid reverse; index. Position No. 3, tap: rapid traverse; feed forward; feed reverse; rapid reverse; index. National Automatic Tool Co.

Circle 45 on postcard for more data



Profilometer for automatic inspection operates at 0.3 in. per second

Inspects Surface Finish Automatically

A UTOMATIC surface-roughness inspection equipment sorts parts in accordance with the microinch roughness measured along an OD or flat surface, including tapers and parts with grooves or shoulders.

The workpieces go from a feed chute onto a conveyor belt which moves them beneath a Profilometer tracer. As the parts leave the tracer, they are automatically directed into an "accept" or "reject" discharge chute in accordance with their roughness. With the equipment shown, contact meter is set to the high roughness limit, and parts that are rough or rougher

are rejected, while all other parts are accepted. Equipment can be furnished to accept work within a selected range of roughness, rejecting parts that are either too rough or too smooth. In addition to the measuring-and-sorting equipment, the company can supply auxiliary items, including equipment for automatic selection of parts to be measured (such as every fifth or tenth part from the production line), signal lights, and controls to shut down the line after a given number of parts are rejected. Micrometrical Manufacturing Co.

Circle 46 on postcord for more data

Stock Cradle and Straightener

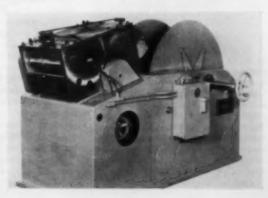
A combination cradle and straightener for coiled stock is available in models for handling coils as large as 36 in. wide, 60 in. in diameter, and weighing 20,000 lb. Either hardened rolls or a slat conveyor for holding the coils is powered by a variable speed reducer. The rate of stock delivery is easily adjustable. Rotating side plates which turn on Timken

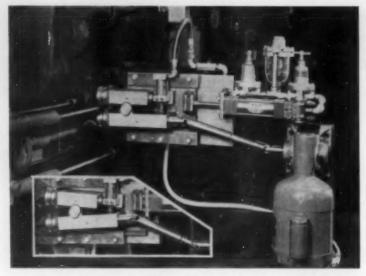
roller bearings prevent crimping or damaging the edges of the stock. Sealed ball bearings support the rotating plates.

The straightener will handle up to 3/16-in, thick stock, has two sets of powered driving rolls and either five or seven straightening rolls. Special Engineering Service, Inc.

Circle 47 on postcard for more data







Stock feeder does not use feed fingers and tubes of automatic screw machines

Feeds Automatic Screw Machines

This stock feeder provides for reloading a multiple spindle screw
machine without stopping the machine
each time the previously fed stock is
used up. The device includes a pair
of rollers which are adapted to engage stock between them to feed the
stock to a screw machine spindle which
is aligned with the rollers. The rollers
are disengaged from the stock before
the machine indexes to its next position so that they will not interfere
with the indexing operation.

After the machine has indexed, the rollers are moved into engagement with the stock in the next spindle which has become aligned with the rollers. This operation is repeated each time that the machine indexes.

The rollers rotate in such a manner as to feed additional length of stock

Rotary Broaches

PRODUCTION of taper shank rotary broaches is announced. The tool is made with high spiral or helical cutting edges, and when end pressure is applied, these helical cutting edges remove metal in a true shear cutting manner. The chips removed resemble steel weel in both form and texture. The cutting edge of the rotary broach forms a circle; there is said to be no tendency to produce elliptical, bell-mouthed or uneven holes. Shearcast Tool Co.

Circle 49 on postcard for more data

to the spindle. When the stock reaches the stop a collet automatically clamps on the stock. The cycle of operation is then repeated. The device can feed out approximately three times the length the machine is designed for. Roll-O-Matic Industries.

Circle 48 on postcard for more data

Gear Checker

A m automatic motorized precision gear checker will inspect and sort spur or helical gears produced by conventional gear shaping methods for three variables in tooth dimensions. The checker inspects gears by electronic indicators and master gear means for incomplete stroke, oversized and undersized teeth, and thick or thin teeth. Gears that do not meet inspection requirements for these dimensions are directed into selected chutes which sort out oversized, undersized, thick-tooth and thin-tooth gears.

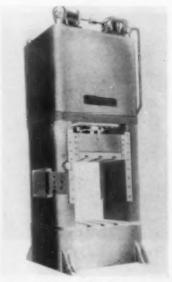
Each tooth in gears passing through the checker is individually checked for thickness by a method that causes the gear to be rejected if any tooth does not meet the tolerance specifications.

Gears are loaded by hand and fed through the various inspection stages in the checker automatically. The gears first pass through a set of master gears where they are immediately rejected for incomplete tooth length if they will not roll through. Next the gears are checked for thick or thin teeth and finally for size. Automatic interlocks prevent the feeding of a gear through the checker until the previous gear has cleared the unit. Indicator lights on the machine tell the operator the reason for the rejection of any individual part. The Red Ring gear checker illustrated inspects three variables in the gear teeth of an integral helical gear and brake drum part for an automotive automatic transmission in 15 seconds. National Broach & Machine Co.

Circle 50 on postcard for more data

Press Line

M ODEL SF 300 double action hydraulic press is electrically controlled for either automatic or semi-automatic operation. The slide return may be controlled by either pressure or length of stroke setting. The slide return may be inched up or down, or the press operated manually when the slide is in the up position. The pump bypasses at zero pressure. This side frame press may be equipped with hydraulic cushions in the bed for metal drawing applications. It can be built to meet practically any speed,



Clifton steel hydraulic press

stroke or platen size requirement, and is available in capacities of 50, 100, 150, 200 or 300 tons. Clifton Hydraulic Press Co.

Circle 51 on postcard for more data

Drilling Units

AUTOMATIC operations and variable thrust to suit the material being machined are the outstanding features of a new line of cam-fed drilling units. Drilling, tapping and allied operations are performed with automatically controlled operational cycles.

Cam-Matic drill units have an electric clutch in place of conventional linkages and power transmission devices. An adjustable rheostat permits adjustable thrust control. The amount of thrust required for a particular job may be dialed with the rheostat dial. Should the drill unit encounter an obstruction, the electric clutch will slip. By adjusting the rheostat for thrust just beyond the maximum required for the operation, it is possible to use the electric clutch as a dull drill detector. When the drill becomes dull, or is broken, the clutch will slip, preventing offsize holes or poor drilling.

A heavy machined cam provides forward motion to the quill. The periphery of the cam determines the rate of quick approach, the drilling time, the length of stroke, and the rate of rapid return. The units are automatically cycled. Mechanical devices, traveling with the quill, trip limit switches to end the cycle or to reverse the quill travel and spindle rotation for tapping operations.

Additional features include extra rigid quill construction to prevent



Morris cam-led drill unit

spindle "hangdown"; protection to prevent surging on breakthrough; maximum bearing/stroke ratio for extreme accuracy; three drive arrangements; two model sizes for capacity to 1 1/4 in. stroke to six in.

Completely separate compartment



Pioneer vacuum chuck, and detail at small suction cups

Vacuum Chuck for Milling Machine

THE Octopus Grip vacuum chuck was developed by Convair Div. of General Dynamics Corp. for use on a skin milling machine. Upper chuck holds pattern, lower chuck holds material. Approximately 1000 suction cups can be used to hold skin during milling operation. Small inset shows suction cups with removable rubber

grommets. A screw in the center hole serves as a shut-off valve. This allows any shape skin to be placed on the chuck without sealing off the vacuum source. The chuck is fabricated from 921-T, a specially alloyed cast aluminum tooling material. Pioneer Tool Engineering, Inc.

Circle \$3 on posteard for more data

for changing pick-off gears, separate electrical section, sliding base for easy set-ups, wide range of spindle speeds between 20:1 and 1320:1 ratios to cam speed, and a self-contained automatic lubrication system are further features. Morris Machine Tool Co.

Circle 52 on postcard for more data

Drill Press

R ATED at one-in. capacity in cast iron with a one-hp motor, the 18-in. Royal model LE drilling machines are equipped with a No. 2 or No. 3 Morse taper spindle. Single spindle floor models, and single and multiple spindle bench models are offered. They are shipped complete with electrical controls including overload protection, motor mount, vee belt, pulleys for spindle and motor, and contour-fitting belt guard as standard equipment.

The spindle is full-floating on four precision, sealed, prelubricated bearings. Six spindle speeds are provided ranging from 390 to 3100 with an 1800-rpm motor; 324 to 2580 with a

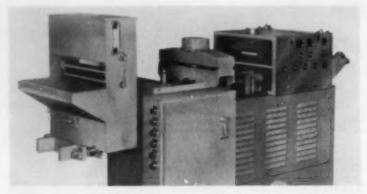
1500-rpm motor; 259 to 2060 with a 1200-rpm motor; or 216 to 1715 with a 1000-rpm motor.



Royal model LE drilling machine

A direct-feading depth dial incorporates a positive stop. The hand feed mechanism has three levers with large knobs. Also available at extra cost is a new geared power feed. Large tables and bases feature machined working surfaces. Cincinnati Lathe and Tool Co.

Circle 54 on postcard for more data



Sezco feed unit includes a stock oiler and aptional pull-through stock straightener

Movable Hydraulic Press Feed

A SELF-CONTAINED hydraulic gripper feed unit can be moved easily between presses. It can feed into the press from right, left, front or back. Width handled can be up to 20 in. or up to 48 in. Accuracy of feed is said to be within 0.003 in. of the selected setting. The unit is timed by the press ram stroke.

A hydraulic tank assembly serves as the base of the press feed unit and is a reservoir on which the other sub-assemblies are mounted. It comes equipped with a front stock guide and a rear stock guide assembly, a gripper assembly, a stock retainer assembly, a motor and pump assembly, four adjustable floor legs, and a control panel.

The front stock guide keeps the stock at the proper level, and in line for the desired positioning in the press die. The stock guide rolls are adjustable, and designed to make it easy to adjust for various stock widths. The rear stock guide assembly provides a solid guide and is adjustable.

The gripper assembly is attached to the end of the piston rod and travels on hardened and ground bars. The gripping mechanism consists of a double-action hydraulic cylinder, sequenced with the feed stroke, to permit accurate feeding. This unit provides a pinch grip pressure of up to 6000 lb. The stock retainer assembly is of the opposed roller-type construction and is designed to prevent the stock from slipping backward on the return stroke of the gripper. Sesco, Inc.

Circle \$5 on postcard for more data

Press Unloader is Portable

SwiveLing for side or back unloading is the feature of a completely redesigned portable press unloader. It can be moved quickly from press to press and is easily adjusted for different jobs, according to the maker. It is also recommended for use with backgeared presses where the gearing prohibits the mounting of standard overhead Iron Hands. The series 3000 Iron Hand has the same jaw, air cylinder and controls as the standard overhead model. The unit is mounted on a heavy steel base on wheels. It can be adjusted up or down on its vertical post to suit the die height, and swiveled into unloading position. Since the jaw travel is in a straight line, the unloader can remove small parts at high speeds.

The jaw travels in and out on a straight line. After a ram completes its down stroke, the hand moves into the die and grips the stamping. When it has clearance, the jaw lifts the stamping, moves back out of the die and drops the stamping in a tote box.



Press unloader for the job shop

Then it returns to its original position. Sahlin Engineering Co.

Circle 56 on postcard for more data

Horizontal Motors

Uniclosed horizontal motors with face type mounting brackets for direct connection to driven equipment has been developed to rerated NEMA specifications. Fitted with Unimount face type mounting brackets in either NEMA Style C or Style D specifications, the motors are available in ratings from one to 30 hp. Ventrifoil deflectors direct air and deflect water. The integrally cast one-piece frame



STYLE "B"

U. S. Uniclosed face type motor

is heat-treated to prevent warpage. Windings are asbestos-protected. Handy split-type conduit box may be located on either side of the motor. Lubriflush lubrication of ball bearings assures complete purging of old grease. Rotors are solid cast and dynamically balanced. U. S. Electrical Motors, Inc.

Circle 57 on postcard for more data

Recording Gage

A PERMANENT record of air gage measurements is provided by a device which combines the Dimensionair, panel mounted to facilitate installation, with a Bristol strip-chart recorder. A special gage head is used for the continuous measuring of sheet or strip material. The recorder chart provides both a permanent record and a constant visual check of the thickness of the material. The size trend is easily followed by observing the position of the line on the chart.

Other units will automatically adjust the machine so as to make it produce material of the required thickness. Federal Products Corp.

Circle 58 on postcard for more data

Paints Intricate Parts

PAINTING round and deep-draw parts reportedly is now easy and economical with a new automatic rotary spray-painting machine. It will handle areas with diameters up to 15 in.

The piece part is put into a mask and the foot pedal or hand valve depressed. The part is automatically clamped into the mask, to the desired pressure; the guns operate to a predetermined setting and the clamping cylinder retracts after the cycle is completed. The guns rotate beneath the mask, or they may be used in a fixed position.

There are four dials on the front for controlling the atomization of air to the gun, speed of gun rotation, length of spray time, and the machine air for automation.

The machine is totally enclosed. Air is drawn across and under the top of the machine and exhausted through a 12-in. diameter outlet at the rear. The exhaust requires only 900 cfm of free air. Installation requires only the attachment of an exhaust system, filtered compressed air and paint-pressure tank. Conforming Matrix Corp.

Circle 59 on posteard for more data

Hydraulic Pump

Leakage is minimized in a series of gear pumps designed for 1500 psi service. End clearance is kept small by a thin flexible steel-backed bronze wear plate. The plate is kept in contact with the gears by controlled hydraulic pressure. Four models with displacements of 0.77, 1.0, 1.3 and



Cessee 1500 psi geer pump

1.65 cu in. per revolution will be offered with various porting arrangements. Weight is about 6½ lb. Cesana Aircraft Co.

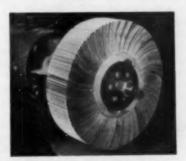
Circle 60 on posteard for more data



Flexible pointing mochine for deep-draw parts such as hub caps.

Polishing Wheel

THE PG polishing and grinding wheel consists of hundreds of pieces of cloth coated abrasives fac-



PG wheel uses all instead of compound, features long life

tory-formed into a wheel that can be used on rotary or straight line automatics, or on standard lathes for hand operations. An abrading-polishing action and the wheel's ability to conform enable it to remove mild draw marks in the same process in which it generates a buff-type finish.

At a plant where the product is polished and buffed prior to plating, PG wheels in a 220-240-320 grit sequence are producing an average of 11,000 pieces before needing replacement. On a straight line automatic machine, 13 heads with PG wheels are now in operation, and have re-

placed 20 heads using a combination of 12 set-up wheels and eight sisal buffs. Production has been increased from 1800-2500 pieces per day to between 4000 and 4500 pieces per day. The finish produced by the wheels is equal to 41/2 micro-inches, as compared to a finish of between 51/6-6 micro-inches with the previous method, Its rate of cut and the finish it produces remains constant until it is worn down to the hub. It is not necessary to increase arbor speed to maintain cut during the life of the wheel. Minnesota Mining and Manufacturing Co.

Circle 61 on postenrd for more data

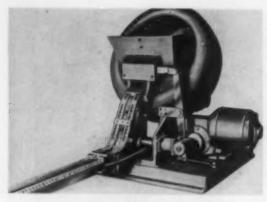
Radiant Furnace

STANDARD radiant tube fired, controlled atmosphere tool room furnaces are announced to fill the gap between the large production equipment and small muffle-type tool room furnaces. These units are available in a variety of sizes, for operating temperatures ranging as high as 2100 p

The doors are power operated and designed with a special seal. The new burner system is said to overcome the objectionable tube roar sometimes found in this type of burner. A full fame curtain is built into the door sill. Bellevue Industrial Furnace Co.

Circle 63 on postcard for more data

PRODUCTION EQUIPMENT



Feedmatic rotary hopper feed system

Rotary Feed System

A ROTARY hopper feeding system, designed for fast, accurate parts feeding incorporates a model 180 hopper with power feed tracks. Available with as many as four feed tracks, the rated output of the system illustrated is 4500 corrected parts per hour, per track. In addition to feeding, the installation can be used in conjunction with sorting, counting and inspection operations.

The unit operates on a fully enclosed, continuous duty motor that is equipped with a slip clutch for overloads. Twelve-pitch gears, mounted on ball bearing shafts, are used throughout for heavy duty service. All gears and bearings operate in an oil bath. The hopper has a three-point mounting for easy installation on rough or uneven surfaces. Feedmatic, Inc.

Circle 63 on postcard for more data

Strain Gages

THREE new standard SR-4 bonded resistance wire strain gages with flat grid, fine pitch, and Bakelite base are announced. Type ABF-7, with ¼-in. grid length, may be used in place of wrap-around type gages of short grid length. Type EBDF-7T+ is a self-compensated gage of ¼-in. grid length for use on titanium (TRC-70 or TRC-130 or equal). Temperature range is 50 to 250F. Type EBDF-

13Q+ is a self-compensated gage of %-in. grid length for minimum response to temperatures between 50 and 250F when cemented to quartz. Bonded to unrestrained members of other material, it would measure thermal expansion stress when temperature-cycled. Alternate 13T+ type gages for titanium and 13Q- and 7Q- for quartz are also available. Baldwin-Lima-Hamilton Corp.

Circle 64 on postcard for more data

Primer Stripper

STRIPPER No. 110 is designed to remove zinc chromate primers from aluminum without affecting the metal surface. A two-phase solvent material, it is used full strength. The part to be stripped is immersed completely in the solvent, under the surface oil seal, which should be maintained continuously. According to the manufacturers, the material will remove zinc chromate primers and other finishes from aluminum with complete safety when used as recommended. The material has a flash point of 290 F, and does its job faster when heated to 140 to 180 F. A pressure water rinse, warm or cold, is recommended to float off the loosened paint. Further information is available to readers writing on company letterhead to Oakite Products, Inc., 128A Rector St., New York 6, N. Y.

Switch

HEAVY duty machine tool switches that incorporate a water-tight feature, NEMA types 1-A, 2, 4, and 5, are designed to withstand water, dust and oil conditions even under severe operating conditions. An O ring shaft seal, captive cover screws, a water-tight switch cover, and six back cover screws located at key points assure positive water-seal. In addition a glass fiber arc shield has been adopted which is said to be 15 times more arc resistant than other types. R. B. Denison Mfg. Co.

Circle 65 on postcard for more data

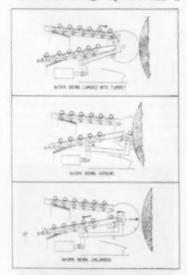
Grinder Loader

A TURRET type device will automatically load work pieces between centers and remove the pieces when ground. With variations to suit conditions it can be adapted to a wide variety of small parts that can be rolled by gravity on inclined rails.

The device supports the work near both ends. A number of work pieces may be placed on the loading rails by the operator or fed to the loader from a conveyor. Latches placed along the loading rails separate the parts and operate to release a single piece at a time to the turret.

The turret is carried on a swinging arm, the motion of which is controlled by a small hydraulic cylinder and piston operated by a valve in the operating cycle of the machine. When a work piece is received in the turret, the arm swings the turret to locate the piece in line with the work centers. As the work centers enter the center holes the piece is raised to clear the turret fingers and permit free rotation.

After the piece has been ground, the turret arm swings upward and a



Operation of the Norten loader for cylindrical grinders

latch indexes the turret so that the piece rolls onto the inclined unloading rails. The turret arm continues its upward motion to the loading position where the turret receives the next piece. Latches along the unloading rails automatically accept and release one piece at a time keeping the pieces separated. Norton Co.

Circle 66 on postcard for more data

Custom Smelters Have Reduced Price of Copper. Zinc Up to 131/2 Cents per Pound; Cost of Lead Also Is Increased.

By William F. Boericke

Steel Production To Expand

Steel manufacturers are confident of the long-term demand. Republic Steel has announced a \$130 million expansion to boost its ingot capacity 16 per cent within the next two years. Jones & Laughlin is considering adding 30 per cent to its ingot and steel finishing facilities. Inland Steel predicts a 25 million ton increase in national steel capacity in 10 years. The Iron and Steel Division of the Business and Defense Services Administration has recommended that the Nation's ingot capacity be boosted from 125.8 million tons to 150 million tons by 1960.

How to finance the heavy cost of new construction has the producers worried. Fast tax writeoffs are out of the window from now on according to Washington advices. There is some thought of raising steel prices to bolster earnings and attract capital thereby, but there are obvious reasons against attempting this. Yet some steel customers appear willing to pay higher prices for certain products if they could be assured of a steady supply.

There appears to be no question that the industry will see peak operations continue through the fourth quarter and into the first quarter of 1956. For all practical purposes the industry is running at capacity today although the reported rate is slightly less than 100 per cent. Any idle facilities are just too costly to operate except under emergency conditions.

It appears now that the output for the full year will top 114 million tons, comfortably ahead of the previous record of 111.6 million tons in 1953. New steel orders have been running at 110-115 per cent of capacity. Iron Age has commented that if producers accepted all the pro-offered business the ratio would be 130-150 per cent. Strict allocations are part of the program when order books are opened for 1956. To keep from running short, big mill customers have had to buy warehouse steel.

Warehouses Are Short of Steel

But the warehouses themselves are unhappy. They are short of critical products and are confronted with delayed deliveries from the steel mills. Particularly distressing is the shortage of plates and structurals for which there is special demand from the railroad car builders at this time. Repair of storage tanks damaged by the floods is said to call for more than

10,000 tons of plate alone for this purpose. Steel men believe there is every indication that the order carryover for plates at the year end will be greater than for any other product.

The automotive industry gives no indication as yet of curbing its apparently insatiable demand for steel. But some spokesmen have indicated privately their belief that demand for cars in 1956 might be 10 per cent less than 1955. This would leave about 1,800,000 tons of finished steel for other uses and with steel capacity scheduled to increase to some extent, the situation might become easier as the year advances. Others are just as emphatic in declaring there will be no let-up in demand and in consequence relief in coldrolled sheets especially is a long way off.

Stainless Steel Facilities Increased

Manufacturers of stainless steel are experiencing excellent demand. Last year the buying of this highpriced item was the first to be curtailed when steel demand was at a low ebb. Now inventories have to be rebuilt in addition to supplying normal consumer requirements. Republic Steel has completed a 25,000 ton addition to its stainless steel foundry capacity, its third major stainless steel expansion in the past 16 years. The Nation's largest producer of stainless, alloy, and heat resisting steel brings its annual capacity to 82,000 tons.

Copper Demand Weakens

Consumers of copper are becoming price conscious to an increasing degree. Frantic reaching for premium-priced metal has ceased. The situation changed almost over night in mid-October when custom smelters abandoned their 50-cents per pound price-seven cents more than the 43 cents asked by copper producers-and cut the price of scrap copper viciously. Demand for copper futures dwindles as London prices broke on news of the President's illness.

No doubt inventory purchases of copper in recent months has given an unrealistic impression of consumer demand. Many fabricators have been obliged to dig deep into inventories which under LIFO accounting were carried at prices far below present markets. They face the prospect of ending the tax year with insufficient metal to support their copper inventories and unless they can replace them, the income tax assessment on the inventory profit will be very

(Turn to page 106, please)



GREENLEE

special-purpose machines for profitable mass production



Master brake cylinder machined on above Greenlee Special Machine.

THEY SAVE WORK ... THEY SAVE MONEY

If you are being outdistanced in today's swift race for production...faced with narrowing profit margins...it will pay to investigate Greenlee Special Machines. Savings effected on drilling, reaming, boring, counterboring and tapping operations will quickly amortize your invested dollars.

Wheel cylinder machined on Greenlee Special Machine shown below. (Above) Greenlee Horizontal Indexing Machine designed for processing master brake cylinders has proved itself with raised quality and lowered costs.

(Left) Greenlee Two-Way Horizontal Indexing Machine equipped with Power Clamping and Automatic Unloading increased previous production rates and lowered costs.

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SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

1

Torque Converters

Torque converter combinations and their adaptability to industrial, agricultural and marine uses are shown in a folder which also provides a chart to select the appropriate combination to fit a specific use. Long Mfg. Div., Borg-Warner Corp.

Steel Sheets, Strips

Entitled "Buyer's Guide to Sheets and Strip," an eight-page bulletin lists more than 20 different kinds of flat rolled steel furnished in coils, stock sizes, and cut-to-order blanks. Suggestions are given for stock selections and buying to achieve maximum economy coupled with best end results. Bulletin 20-1. Joseph T. Ryerson & Son, Inc.

Air Device

The complete line of Controlled-Air-Power devices are shown in eightpage bulletin ML-3. This book contains full color illustrations of an air motor and its interchangeable valves as well as various typical application photos. It also contains illustrations and descriptions of such standard items as drill press feeds, vises, hydro-checks, rotary feed and index tables, etc. The Bellows Co.

Hand Riveter

Bulletin 86P covering their rotating impact spinner-riveter hand gun and other models of the all-pneumatic Airflex portable series is offered by Lemert Engineering Co., Inc.

AN Connectors

Many types of AN connectors can be built up from a few basic components, thereby reducing the number of parts that must be stocked. Bulletin 674-8. Whitney Blake Co.

Cycle Control

A safety electrical control system for presses offers predetermined repeat or non-repeat cycles. Details in a four-page folder. Security Controls,

Light Hand Trucks

Magnesium hand trucks are covered in an illustrated bulletin that provides complete information about the company's line of over 200 models and optional equipment. Magline, Inc.

Drill and Tap Chucks

Bulletin 1-50 describes a newly designed line of drill, reamer, and tap chucks with four-slot design which increases resistance to pull-out and provides greater protection against tool breakage. Scully-Jones and Co.

Aluminum Flooring

Recently developed extruded aluminum flooring sections which interlock to form an all-aluminum floor for trucks and trailers are included in form No. T1-10-755. Reynolds Metals Co.

(Please turn page)

Free Literature, New Plant Equipment, VOID After Jan. 1, 1956 for below

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FIRST Permit No.

Titanium Report

10

An illustrated booklet giving data on the properties of titanium and discussing methods of fabricating the lightweight metal includes tables giving the mechanical properties of both alloyed and unalloyed grades of the metal, and comparative properties of titanium and other pure metals. It discusses methods of forging, annealing, rolling, and descaling and pickling titanium sponge in primary fabrication, and sheet forming, machining, grinding, sawing and joining of titanium in secondary fabrication. Du Pont.

LPG Truck Data

Reports of operational and maintenance savings with liquefied petroleum gas fueled fork lift trucks are detailed in folder SP-21, together with schematic drawings and photo diagrams showing the operation and engineering of LP-gas fuel systems. Towmotor Corp.

Systems Engineering

Examples of the jobs this firm handles in designing control systems, including scanning automotive engine blocks for correct drilling, and control of test cells and wind tunnels, are discussed in brochure C901. Berkeley Div., Beckman Instruments, Inc.

Special Alloys 13

Technical bulletin VM-101 on vacuum melted metals and alloys which includes both general information and technical data was issued recently by Carboloy Dept. of General Electric Co.

THIS POSTCARD

Machine Control

Features of package drives for speed control of machine tools and other applications requiring accurately variable speed over a wide range are described in bulletin 51B8166, available from Allis-Chalmers Manufacturing Co.

Turret Lathe

The 6DRE-40 automatic turret lathe of 40 hp includes a new headstock, wider speed and feed range, and automatic electric control of spindle and slides. Potter & Johnston Co.

Molding Facilities

Custom extruding, molding and finishing techniques for rubber and plastics are illustrated in an eightpage bulletin offered by Geauga Industries.

Grease

17

Molykote, type BR2, a general purpose grease with extreme bearing pressure properties, is described in bulletin 101 published by Alpha Molykote Corp.

18 For Press Room

Press room equipment included in a four-page catalog are combination cradle and straightener, centering reel, coil stock cradle, punch press gripper feed units, scrap cutters, power driven stock straightener, and rewinders for paper or scrap. Seseo

Spring Maker

Instructions for specifying springs are featured in an eight-page brochure portraying facilities of the Automatic Spring Coiling Co.

Snap Switches 20

A 24-page catalog describes numerous types of Unimax switches; highsensitivity, metal-cased, immersionproof, general-purpose, AN-type, JAN-type, direct-current, and subminiature switches. W. L. Maxson Corp.

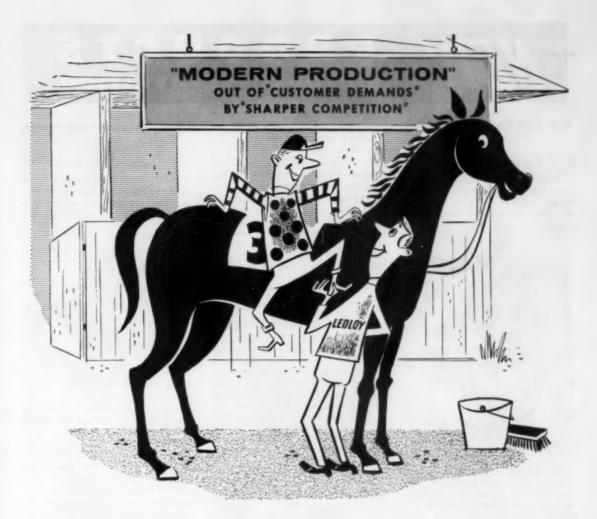
Grinder 21

Catalog No. G-550-1 introduces two anti-friction centers as well as the line of solid centers for grinding machines. Ready Tool Co.

Cold Drawn Tube 22

Various applications of cold drawn Electricweld tubing, featuring fine interior finish, are described in a new four-page brochure recently prepared by the Jones & Laughlin Steel Corp.

14



Want a "Leg Up" On Production?

If you're "left at the post" in today's race for quality production at competitive prices, better study Ledloy's* form sheet.

- · Faster feeds and speeds
- Longer tool life
- · Fewer production line breakdowns
- Finer finish—often eliminates final machining.

Truly a steel with "Built-in Productivity."

For proof of increased production at lower costs, try a partial run with Aristoloy Leaded Steel.

*Inland Ledloy License



COPPERWELD STEEL COMPANY . STEEL DIVISION . WARREN, OHIO

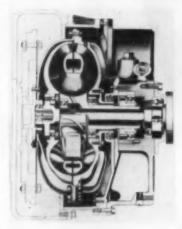
HEW

PRODUCTS AUTOMOTIVE - AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Torque Converter

Three new torque converter couplings nominally rated at 280 lb-ft of torque are now available. With single stage two phase design, the re-



action member is mounted on an overrunning clutch which permits rotation with the runner, and operation as a straight hydraulic coupling. The change from 2.1:1 conversion stage operation to straight hydraulic coupling stage and back is automatic, depending only upon the amount of torque required in the drive line. The coupling is offered with plain flange (shown), flange with SAE No. 3 clutch housing, or plain apline shaft without clutch housing. Fuller Mfg. Co.

Circle 25 on postcard for more data

Servo Pump

An electro-hydraulic servo pump unit for rotary and linear servo applications is now available. The 3000 psi aircraft type unit, designated series PV 3918, is rated at 55 hp and delivers 35 gpm at 3500 rpm. It is available as part of a variety of hydraulic transmission assemblies, built up as packaged units to meet specific job requirements. It may be com-

bined with a single fluid motor or linear actuator or with two fluid motors in series or parallel.

The servo pump unit is normally controlled by an electronic or magnetic amplifier. Control pressure for the servo pump can also be used for external sequencing, such as uncoupling fluid motors from the load when the pump is inoperative. Vickers, Inc.

Circle 26 on postcard for more data

Nut with Handle

Type N 2603 self-wrenching locknut has been designed with greater fatigue strength and less weight. A lug on the nut prevents it from rotating during wrenching of the bolt by bracing itself against an adjoining surface. Both the nut and the lug are steel with a cadmium-plated finish. A red nylon insert in the nut provides the locking feature. Thread sizes of the six nuts in the series are ¼-28, 5/16-24, %-24, 7/16-20, ½-20 and 9/16-18. The smallest



locknut weighs 1.2 lb/100 and the largest 6.2 lb/100. Ultimate strength of these two locknuts are 5234 and 30,640 lb min. Elastic Stop Nut Corp. of America.

Circle 27 on postcard for more data

Special Bearing

Sinite D-10 is a new self-lubricated bearing material for operation in liquid oxygen and JP-4 fuel. The company also manufactures Sinite D-10-S which is self-lubricating from —90 F to 500 F. Booker-Cooper, Inc.

Circle 28 on postcard for more data

Joins Shaft, Hub

The Gripspring, a machine element recently developed in Germany, is now being manufactured and marketed in the United States. It offers a different



approach to the problem of fastening hubs onto a shaft without the use of splines or keyways. The device provides an assembly which has all the advantages of a shrink fit. No clearances are present. The new device is wedged between hub and shaft under heavy pressure made by hand tools. The outer ring expands and the inner ring contracts. Gripsprings are said to transmit the maximum torque for a given shaft diameter because full strength of both hub and shaft is utilized. An assembly consists of a straight cylindrical shaft and hub bore. U. S. Automatic Corp.

Circle 29 on postcard for more data

Headlamp

Ease of aiming is the feature of the T-3 Safety Aim sealed beam head-lamp, now standard on all General Motors cars and trucks. Three glass knobs cast into the lamp face form the locus of a surface at right angles to the beam axis. A special aimer clips on the car and allows the service man to aim the lights without turning them on or resorting to a wall or other reference. Guide Lamp Div., GMC.

Circle 30 on postcard for more data

Coil Bobbins

Any desired number of lug terminals can be attached to coil bobbins through use of special high production automatic equipment. This



attached lug feature adapts the bobbins for use with printed circuits. The coil bobbins can be insulated from the coil winding by washers as an integral part of the assembly. This not only improves insulation, but facilitates easier and faster production of the finished coil. Bobbins are available in any size with round, square or rectangular core, and flanges of all shapes. Cores are wound from dielectric kraft, fish paper, acetate or combinations, including Du Pont Mylar. They can also be supplied Resinite impregnated. Precision Paper Tube Co.

Circle 31 on postcard for more data

Flexible Joint

A so-called pressure compensator for balancing the end thrust or pressure growth of a pneumatic metal ducting system has been devised. It is particularly applicable to bleed air systems in turbojet and turboprop powered aircraft. This bellows unit balances the tension and removes end load of the duct system and thus the need for heavy structural bracing.

The primary bellows in this pressure compensator provides for thermal expansion, flexure and misalign-



ment of the duct system. To control the tendency of the bellows to elongate or straighten out under pressure, the internal duct pressure is bled off to a series of secondary bellows which create an opposing force to the primary bellows and nullify the end thrust. Compensators are made in all sizes up to eight in. I.D.; handle air pressures of 250 psi or over, and temperatures up to 900 F. Arrowhead Rubber Co. Metal Products Div.

Circle 32 on postcard for more data

Gyro Compass

Contained in a 10½ in. cube, a 22-lb gyro has been test-flown in a helicopter. The so-called Subminiature Gyro Compass is unclassified and offered for use on land, sea or air. A fluid suspension system is used. As a directional gyro, azimuth drift rate



performance is 0.1 deg/hr, while accuracy is claimed to be ¼ deg when used as a compass. American Bosch Arma Corp.

Circle 33 on postcard for more data

Steel Plate

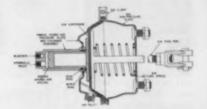
Lead bearing steel plate to be marketed under the trade name of New E-Z-Cut claims improved machinability, and superior welding, polishing and plating properties. Its flame cutting, forming, grinding, and case hardening characteristics are said to be equally as good as those of the free machining plate which the company previously sold under the E-Z-Cut name.

Because of its superior welding properties, in comparison to the high sulphur content steel plate, it is expected that the new lead bearing plate will find increasing favor in applications in which welding, in addition to extensive machining, is involved. Initially, the new steel plate will be available from stock in thicknesses from ¼ to three in. inclusive. Joseph T. Ryerson & Son, Inc.

Circle 34 on postcard for more data

Emergency Brake for Trucks

An independent emergency brake system for air-brake-equipped vehicles is being demonstrated. Hand oper-





ated, it can apply the brakes of all wheels equipped with the device, even if the air lines or brake cylinder diaphragm rupture. It consists of a pressure plate to which is attached a hydraulic cylinder. The plate replaces the pressure plate of the standard air brake or rotochamber. The driver operates a 1000-psi double-action hand pump to apply hydraulic pressure to the rear of the Hydro-Air piston. This in turn actuates the air brake diaphragm and push rod, engaging the service brakes.

The emergency system may also be operated by an engine-driven hydraulic pump or by a separate air reservoir with a driver-controlled modulating air pressure valve actuating an air chamber and hydraulic master cylinder. Systems for vacuum operation are under development. Fawick Brake Div., Fawick Corp.

Circle 35 on postcard for more data

O-Ring

With successful formulation of new synthetic rubber compound No. 47-671, aircraft hydraulic service O-rings for the operating temperature range of -65 to +275 F is announced. The new compound was developed expressly to meet unusually rigid functional and physical requirements such as those included in Government specification MIL-P-18017. Rubber Products Div., Parker Appliance Co.

Circle 36 on postcard for more data

Observations

By Joseph Geschelin

Sans Slip

As far back as we can remember the self-locking or non-slip differential has been the objective of designers. More recently, several makes have introduced successful mechanisms for heavy duty vehicles; and at least one producer has been making a passenger car differential of non-slip type in limited volume. When Packard announced its 1956 line we were intrigued to find that Spicer would be supplying the non-slip type differential as optional equipment. Spicer was really the "sleeper" in this instance.

About Brakes

It is claimed by some that a form of disk brake is the answer to the gathering braking problem on passenger cars. Foremost in this development has been Ausco; and we have heard of several other makes delving into a related design. It is now felt that any radical changes in the brake system may depend upon whether or not the industry switches to a smaller wheel, say for 1957 models. We have not succeeded in tracing the probable course of events at this writing. Much depends, we would guess, upon the ability of the tire producers to shift to the production of smaller tubeless tires so soon after the major and costly shift to the pres-

Fretting Corrosion

Fretting now is recognized as a form of wear caused by two surfaces rubbing together. Commonly, ferrous metals fretting in air produce a reddish oxide which acts as a lapping compound. Fretting corrosion is a special case where one or more of the surfaces react with their environment. It will interest our readers to know that the August issue of "Lubrication" published monthly by The Texas Co. is devoted entirely to this subject.

Quality

Considering the widespread use of quality control in the most modern sense, it always puzzles the writer to account for the troubles-some minor, some quite serious-experienced by car owners with their new cars. Surprisingly enough these troubles are found even on the most expensive We can surmise that the cars. troubles we hear about-and experience-occur on a rather small percentage of production. Nevertheless, they hurt this minority and frequently cause an owner to switch to another make. Of course, when cars are produced at a yearly rate of 8million units, it becomes difficult to police every operation. Yet it is obvious that something is needed to correct the situation.

Smoke Control

The adverse effects of the increased longevity of cars and trucks is coming home to roost. In many communities the police authorities are seeking changes in traffic regulations to get smoking exhausts off the road. In Detroit, the authorities are trying to write a regulation to the effect that visible smoke three feet from the vehicle is a violation. What it adds up to is the manufacturers and dealers would find it wise and profitable to sell the drivers of old cars on the benefits of good maintenance.

Automatic Handling

We learned recently from an old line machine tool builder that the company has developed automation for machine tools which is in demand by other builders. It is curious but true. It seems to us that herein lies something that parts makers and smaller manufacturers might be able to adapt. Automatic loading and unloading mechanism for otherwise automatic machines will provide the needed automation on jobs that cannot possibly justify transfer or single purpose machines.

About Silicones

Apparently silicones still remain in the category of elusive chemical formulations understood only by the specialists. Yet silicones have many useful properties available for exploitation. One of the most recent is their use in treating upholstery and convertible tops to shed water. High temperature lubricants for conveyors operating in heat treating furnaces and drying ovens can live better in high temperature atmospheres than any other type of lubricant. Recently too a heat resistant paint, formulated with silicone, has been used in production for coating exhaust manifolds. There must be other useful applications in automotive plants and products. We would be grateful to our readers for suggestions and comments.

Cylinder Boring

The problem of holding cylinder bores round and axially true and to close tolerances is basic in modern V-8 engine production. We found recognition of this factor in the design of a transfer machine now under construction. It has the largest and heaviest and most massive boring heads we have seen to date.

Push Button

With little advance notice Chrysler and Packard have introduced pushbutton gear shifting for automatic drives. Chrysler employs a mechanical hook-up; Packard relies upon electrical contacts-through jacks-and a servo motor on the transmission. Both developments were so closely guarded that one of the largest producers of electronic equipment-including radio and TV-was caught completely off base. Here is a company that has designed and built push-button controls of both mechanical and electronic types for 25 years or more. It has the know-how and it has years of production to back it. This background is available to interested motor car producers right now.



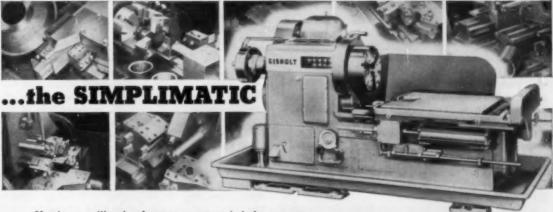
All these different tooling setups



show the amazing versatility



of this fully automatic



Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these-jobs that would otherwise be put on special machines-built at extra-special cost. But this (and don't miss the important point!) is a standard machine-at a standard price.

If you have medium or long runs on parts up to 331/2" in diameter, get the facts about the Simplimatic Automatic Lathe.

Madison 10, Wisconsin

TURRET LATHES . AUTOMATIC LATHES SUPERFINISHERS . BALANCERS . SPECIAL MACHINES



represents the collective experience of specialists in the machining. merface-finishing and balancing of round and partly round parts. Your problems are welcomed bere.

THIS CATALOG may show you how the Simplimatic can save thousands of dollars for you as it is doing for many others. Write for your copy.

Gisholt Machine Co. Madison 10, Wisconsin Gentlemen: Please send my copy of the Simplimatic Catalog. Company..... Address..... City..........Zone....State......



PONTIAC OFFERS

Two Automatic Transmissions for 1956

HOREMOST among the mechanical improvements in the 1956 Pontiac are the new Strato-Streak V-8 engines—larger than ever and upped in horse-power to 227 in the Star Chief series and 202 in the 870 and 860 series. The upsurge in horsepower comes from the increased displacement, higher compression ratios up to 8.9:1, and improved carburetion.

Bore is 3.94 in., stroke 3.25 in., and piston displacement 316.6 in. Maximum torque of the engine which powers the Star Chief series is 312 lb ft at 3000 rpm. The other version, used in 860 and 870 cars, develops 294 lb ft of torque at 2600 rpm.

A "first" for the Star Chief series is the new Strato-Flight Hydra-Matic transmission which uses a newly developed controlled fluid coupling. The new Hydra-Matic transmission is described in this issue, starting on page 62.

Pontiac offers three body series in 1956. Longer by 2.4 in. overall, the 15 new body styles have a lower looking silhouette. The Star Chief line consists of the custom Catalina two- and four-door hardtops, four-door sedan, and convertible, on a 124-in. wheelbase and the Safari station wagon on 122-in. wheelbase.

In the middle-priced 870 series with 122-in, wheelbase are the Catalina two- and four-door hardtops, a four-door sedan, a two-door, two-seat station wagon and a four-door, three-seat station wagon.

Comprising the low priced 860 series are the Catalina coupes and sedans, two- and four-door sedans, two-door two-seat station wagons and four-door threeseat station wagons.

The two-seat station wagons, with increased cargo

space, have a folding center seat with the back-rest and the cushion folding into the floor. In the threeseat wagons, both the back seat and center seat fold into the floor with a split seat arrangement on the middle seat so that one-third or two-thirds of the seat can remain in place for passengers.

A new electric powered adjustable seat, an optional item which can be moved in six different ways, offers almost unlimited variations in front seat positions. Pontiac mechanical 360 position seat is also available.

Larger venturi or air-intake throats on both the four-barrel and the two-barrel carburetors improve the "beathing" qualities of the 1956 Pontiac engines. The 227-hp engine with four-barrel carburetor is standard for the Star Chief series and the 202-hp engine with two-barrel carburetor is standard equipment for 870 and 860 series equipped with Hydra-Matic.

A new dual exhaust system is optional equipment this year. Chrome twin exhaust deflectors for the dual exhaust pipes appear as an integral part of the rear bumper.

In addition to the new Strato-Flight transmission for the Star Chief series, Pontiac offers an improved Hydra-Matic transmission for the 870 and 860 series and a new synchromesh transmission, incorporating refinements and improvements.

A completely new power steering is optional on the 1956 models. Power brakes and electric window lifts are also available as optional equipment.

Front mounted air conditioning will be continued with a number of new features in 1956.



New **PERFECT CIRCLE** type "**98**" chrome oil ring! Of the 6,003,603 U.S. passenger cars produced from Jan. 1 through Oct. 1 more than half* were equipped with the new Perfect Circle type "98" chrome oil ring!

Better than any other oil ring for new highcompression, high-vacuum overhead valve engines!

- Uniform pressure on entire circumference!
- Multiple tiny springs exert both side and radial pressure!
- · Provides maximum oil drainage!
- · Constant flexing retards carbon accumulation!

*51.5% were new Perfect Circle Type "98" Chrome Oil Rings. 48.5% were all other oil ring types combined, including other Perfect Circle oil ring types.

> Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Toronto, Ontario.

Plymouth Adds New V-8



Sport Suburban with Sportone trim



Belvedere four-door hardtop, a new model introduced for 1956

PLYMOUTH has a wholly new engine for 1956. It is a more powerful Hy-Fire with a polysphere combustion chamber design, 277 cu in. piston displacement and an 8 to 1 compression ratio. Other major innovations include: airfoil rear fenders; a push button drive selector for the PowerFlite automatic transmission; new 90-90 Turbo-Torque Power-Flite on V-8 models; and 90 deg angles at the inlet and outlet blades of the torque converter impeller which are said to give faster breakway performance.

The new Suburbans are an entirely separate line of cars and are available in a wide selection of two-door, four-door, two-seat, three-seat, V-8 and six cylinder models.

A new four-door hardtop with a unique rear window operating mechanism allows full side vision for all passengers. The cars are an inch longer than their predecessors. Standard sedans have an inch more headroom in front, and almost an inch more headroom in the rear.

Safety door latches are designed to keep doors closed even under severe impact. There is a new 12-volt electrical system for 1956.

Both six cylinder and V-8 engines are continued in the line. Compression ratio of the Six is increased to 7.6 to 1, providing 125 hp and better

all-around performance. Six also is available for the first time with a power package consisting of a two-barrel carburetor and special intake manifold which ups the output to 131 hp.

The new 187 hp Hy-Fire 277 engine is used in Belvedere and Suburban models. It is also available in all four lines with a power package consisting of a four-barrel carburetor and dual exhausts, with a resultant increase to 200 hp.

For Savoy and Plaza cars, there is a 180-hp V-8 engine with a displacement of 270 cu in. and with new performance features.

In addition to the completely new rear end styling, the 1956 cars have a new hood ornament, new Plymouth name identification and a new grill. Side trim on all models is of a new design.

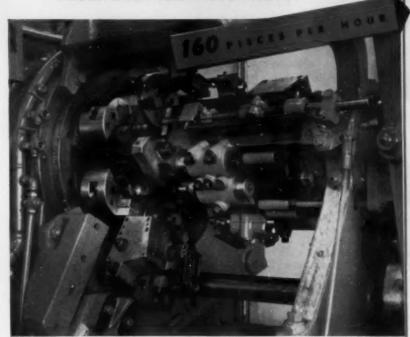
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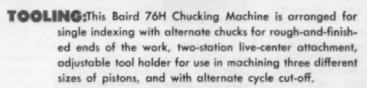
4th in a Series...

OF HIGH PRODUCTION CASE HISTORIES



"TURN-AROUND" JOB...
PRODUCES 2 HYDRAULIC LIFT PISTONS
FROM EACH IRON CASTING...





If your production could benefit by up-to-the-minute, costsaving "automation" tooling like this . . . "Ask Baird About It."

Write Dept. Al



FIRST PASS:

Work is placed in chuck equipped to receive the unfinished casting. Outer end is then rough-ond-finish turned en OD (allewing for grinding); ends are faced; spherical seat roughand-finish turned; end-finish turned; centering seat chemfered and turned, and shoulder diameter turned concentric with OD. Groove cut cencentric with OD.





SECOND PASS:

Work Is turned around efter return to loading station and placed in adjacent chuck, unfinished end out, and passed through machine fer the some operations. The parts are then separated.

THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

17

WHERE YOU WILL GET THE HELP OF SPECIALISTS ON THESE ESSENTIAL PRODUCTION PROBLEMS:

BUTCHLAND INDEPEND TOOTS & AUTOMATIC WHILE S AND TO AUTOMATIC

BEASS



Sedan de Ville, a four-door hardtop

Cadillac Line for '56

Includes

TWO NEW BODY STYLES

A CONTRACTOR OF THE PARTY OF TH

ADILLAC's line of 1956 automobiles presents a completely re-styled appearance, features an impressive list of important engineering advancements, and has been expanded to include two new body styles. The new cars will feature a power train consisting of a new, increased horsepower, large displacement engine and a "controlled coupling" Hydra-Matic transmission entirely new in principle.

The V-type eight cylinder power plant with a bore and stroke of 4.0 by 3.625 in. has a compression ratio of 9.75:1, a displacement of 365 cu in. and produces 285 hp. This compares with the 9:1 compression ratio, 331 cu in. displacement and 250 hp rating of the 1955 engine. The 1956 Eldorado engine develops 305 hp.

Through the use of new high lift cams, new cylinder heads with larger ports, larger redesigned intake and exhaust manifolds and a larger carburetor, the breathing efficiency of the engine has been greatly improved.

Additional engine refinements are: new spark plugs; a new sealed voltage regulator; an increased torque starting motor; a new easily adjusted distributor; a new fan which provides a 20 per cent increase in air-flow, an improved fuel pump; and hydraulic valve lifters which prevent power loss at high engine speeds.

The engine is modified for the Eldorado models. The Eldorado engine which produces 305 hp uses dual

four-barrel carburetors, a special intake manifold, modified air cleaners and new throttle controls.

One of the two new models for 1956, the Elderado Seville is in limited production

To gain full advantage of the engine's added power, Cadillac is introducing an entirely new Hydra-Matic transmission. While retaining a four-speed design, the 1956 "controlled coupling" transmission is completely new in principle and mechanical parts. The unit eliminates the precise timing previously necessary for proper transmission operation and provides an exceptionally even power application through all the shift points.

A new park position which may be used when the engine is running is included on the transmission quadrant to provide a positive lock against car movement when engaged. See description of transmission starting on page 62 of this issue.

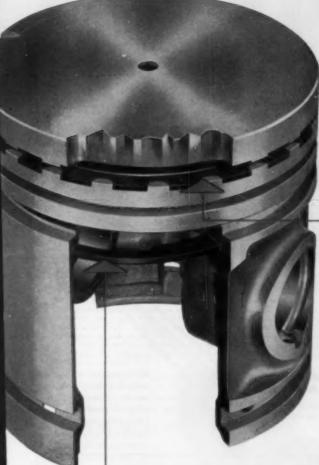
New for 1956 are the Sedan de Ville, a four-door hardtop; and the Eldorado Seville, a limited production model supplementing Cadillac's Eldorado convertible, the Biarritz. With the two new models Cadillac now offers a total of 10 body styles in three series. Additionally, production planning for the Eldorado Brougham is progressing at a favorable rate and the car is scheduled to be presented during 1956.

The Brougham, a four-door, four passenger coupe (Turn to page 112, please)

NOW

CONFORMATIC

PISTONS



CONFORMATIC STEEL CONTROL MEMBER, anchored at the pin bosses only, controls skirt clearance...hot or cold! The metered steel insert allows you to specify the piston clearance you want for your engine. (Clearances from zero to ½ thousandth inch are generally recommended.)

are
available with
LOW COST

Intra-Cast*

GROOVES

Steel protection—top and bottom—gives sensationally longer life to rings and grooves.

This ring is integrally cast into the piston... positioned so that when the grooves are machined, the top ring groove is lined with steel and has islands of aluminum for ring cooling. This Intra-Cast steel-protected groove resists enlargement and materially reduces top ring land wear and rounding. And, it does it at far less cost than other methods.

* Tradename Registered

STERLING ALUMINUM PRODUCTS INC.

Wews of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

Sales of 60 Million Cars Forecast in Next Decade

F. C. Reith, general manager of Mercury Div. of Ford Motor Co., predicts that the automobile industry will sell upwards of 60 million cars within the next 10 years. Average yearly sales of six million cars are thus indicated.

Based on registration figures, annual sales during the last 10 years have averaged about 4.7 million units. If Mr. Reith's estimate is achieved, it means that the industry will sell about 22 per cent more automobiles in the next decade than it did during the last 10 years.

In anticipation of the continued high rate of sales, Mercury this year has been undergoing one of the biggest expansions in history. The expansion program at the Metuchen, N. J., plant alone will result in a 20 per cent increase in car output when it is completed. As one plant expansion program nears completion, another starts.

Ground already has been broken for a 300,000 sq ft addition to the division's assembly plant in Wayne, Mich. Construction will start soon on a new plant in Los Angeles, which will eventually double Mercury output in the West.



HEAVY-DUTY WHITING MACHINE FOR ROAD AND TRACK

The versatile new Model 3-TM Trackmobile houls, switches, and spots railroad cars with ease. Manufactured by Whiting Carp., the heavy-duty machine operates on both road and track. When it is satride a track, the automotive-type road wheels are retracted, and the machine rests on its steel rail wheels for track operation. The Trackmobile is powered by an aby V-8 engine with a displacement of 239 cu in, and an output of 100 bhp at a governed speed of 2500 rpm. Rail wheels and rear road wheels have 12-in. diam mechanical and hydraulic brakes of the internally expanding shoe type.

Carborundum to Build New Facility in Ohio

A multi-million dollar plant for manufacture of abrasive wheels will be constructed by Carborundum Co. near Logan, O. Operation of the new plant, to be located on a 50-acre site, is expected to start late next year, according to the company.

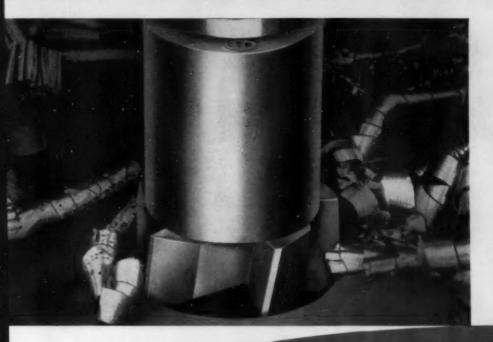
(Turn to page 104, please)

TOTAL FOR MONTH OF AUGUST NEARLY HALF AGAIN GREATER THAN AUGUST OF 1954 Regional Sales of New Passenger Cars

Zono	Fingur	August 1965	July 1955	August 1954	Eight Months		Per Cent Change		
							Aug. over	Aug. over	Eight Months
					1955	1954	July	Aug. 1954	1955 over 1954
1 2	New England Middle Atlantic	33,281 123,188 62,073	35,871 127,832	24,196 87,785 94,194 199,067	270,615 921,497	227,974 729,101	- 7.30 - 3.63	+37.42 +40.36	+18.70 +26.39
1	South Atlantia East North Central East North Central	100,300	78,920 183,489 34,727	199,067	596,348 1,229,246	439,873 960,370	+ 3.61	+51.55 +54.38	+36,38 +29,34 -31,57
4	West South Central West South Central	86,127	84,226 62,600	44,267 42,781	240, 449 418, 906 432, 113	370,070 350,534	+ 3.80 - 3.67	+26.79	+13.08 +20.47
1	Meuritain Pauliti Lucation Not Determinable	86,127 80,736 22,697 77,241	29,701 72,888	21,000 44,267 42,781 14,342 41,540	433,113 183,582 884,983	111,746 350,166 1,837	- 7.30 - 3.63 + 8.10 + 3.61 + 1.22 + 3.80 - 3.67 + 10.61 + 6.46	+99.65 +85.94	+37.45 +54.94
	Tatal-Melod Stone	890,984	647,248	440,312	4,817,320	3,731,428	+ 1.81	+49.96	+29.10

States comprising the various regions are: Ione 1—Coun., Me., Mass., N. H., R. I., V. Zone 3—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C.

Zone 6—Iowa, Kan., Mina., Mo., Nob., N. D., S. D., Zone 7—Ark., La., Okla., Tex Zone 8—Aria., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Col., Orc., Wash



Counterbering a hole in a steel workpiece. Notice the chip uniformity. Here is evidence of the free-cutting action you get with Continental Counterbores. Double driving lugs on the cutters engage double abutments in the holders to give a balanced, positive drive. Notice, too, the wide cutter flutes aiding in chip disposal.

CTW

How to get smooth cutting and ruggedness with large diameter COUNTERBORES

And even after the toughest cuts the Continental Cutter disengages from the holder with a quick twist of the wrist. Because of the shape of the driving members, wedging or jamming cannot eccur to delay the interchanging of cutters.

and quick, twist-of-the-wrist disengagement, too

Machine operators know that the real test of a counterbore drive is how it stands up under the stresses imposed during large diameter cutting operations. And operations like these have been the proving ground for Continental Counterbores. In customers' plants Continental Drives and Cutters, regardless of size have demonstrated their extreme ruggedness. An added feature to save minutes: Each Continental Counterbore Holder accommodates a wide range of cutter sizes.

Continuated Counterborn Sets are evaluable to your choice of sizes. Each is fully described to Bullatin 20446. Write for your copy testay.

Vontinenta

TOOL WORKS
Division of Ex-Cell-O Corporation
Detroit 32, Michigan

Industry News

(Continued from page 102)

1956 Plymouth Prices Increased \$62 to \$104

Prices on the 1956 line of Plymouth cars are from \$62 to \$104 higher than comparable 1955 models. The largest increases appear in the lower-priced Plaza Series and the middle-priced Savoy Series. The average increase for the entire line is approximately five per cent.

With the exception of power steering and automatic transmission, prices on major accessories are generally the same as for 1955 models. Power steering was reduced \$15 to \$75 and PowerFlite automatic transmission, which is now push-button controlled, has been increased \$5 to \$170. Plymouth's V-8 engines are priced at \$96 above six-cylinder engines, the same as for 1955 models.

Plymouth has grouped all its 1956 station wagons under a separate line, to be called the "Suburban." A price comparison between 1955 and 1956 models, therefore, becomes difficult because of variance in equipment offered. For example, the 1956 Sport Suburban four-door model, although comparable to the 1955 Belvedere four-door Suburban, has a roof top carrier as standard.

PLYMOUTH PRICES*

PLYMOUTH PRICES	*
Plaza Series 1958 Four-Door Sedan \$1,726 Club Sedan 1,636 Three-Passenger Coupe 1,594	1965 81,622 1,582 1,490
Savoy Series Four-Door Sedan	81,714 1,674
Belvedere Series Four-Door Sedan	\$1,806 1,766 1,981 2,152
Suburban Series \$1,797 Deluxe Two-Door 2,042 Custom Two-Door 2,086 Sport Four-Door 2,244	81,897 1,973

Prices do not include distribution, excise and handling charges, or state and local taxes.

Pan American Places Orders For 45 Jet Transport Planes

Pan American World Airways has placed orders for 45 jet transport planes to cost in the neighborhood of \$269 million. Definitive contracts have been executed with Boeing Airplane Co., Douglas Aircraft Co., and Pratt & Whitney Div. of United Aircraft

Corp. manufacturers of the jet turbine engines to be used.

Twenty of the 45 aircraft will be delivered by Boeing between December, 1958, and November, 1959. The plane, powered by P&W J-57 jet engines, will carry 104 passengers in standard configuration and 125 in tourist models.

Delivery of 25 Douglas jet Clippers will begin in December, 1959, with the last to be received by the airline in January, 1961. These planes will carry 108 passengers with standard seating or 131 tourist-class passengers.

The Douglas jet Clippers, which are scheduled for delivery a year after the Boeing type, will have a wing area seven per cent larger, will carry six more passengers in tourist class, will have slightly greater range, and will be equipped with a larger-type Pratt & Whitney jet engine.

Both aircraft are designed to cruise up to .88 Mach number (88 per cent of the speed of sound). A contract cruising speed of 575 mph at 30,000 ft is the same for both types.

AMC Cites Safety Merits Of Unitized Car Bodies

While most automobile companies are stressing such safety items as new door locks, padded instrument panels, and seat belts for 1956, American Motors Corp. feels that more thought should be given to basic structural design of automobiles. Single-unit body construction provides greater impact absorption in head-on collisions than cars which have body and frame constructed separately, according to Meade F. Moore, AMC vice-president in charge of engineering and research.

Although Mr. Moore agrees that the tooling costs for changing over to the unitized type of construction is the major deterrent at present, he feels torsional rigidity of a car body is one of the most important aspects contributing to the safety of a passenger. When the body and frame are combined, or welded, into a single unit, the car is able to "soak up" more of the force from an impact, thus reducing the deceleration to the passenger, he states.

Mr. Moore predicts that by 1960 the unitized body principle will be adopted to some extent by every automobile manufacturer. AMC has joined other car companies in offering such safety devices as seat belts, crash padding, improved door locks, and steering wheels for 1956. The company first brought out safety belts as optional equipment in 1949 but dropped them.

MEN in the NEWS

(Continued from page 41)

Pratt & Whitney Co., Inc., Machine Tool Div.—Edward J. Ferris has been made general superintendent.



Electro Dynamic Div., General Dynamics Corp.—William L. Pharmet has been named assistant sales manager.

Northrop Aircraft, Inc.—Jack A. Stiehl has been made manager of contract administration.

Boeing Airplane Co.—A. M. Gonnella and Ward E. Parsons are now service manager for the Pilotless Aircraft Div. and director of spares for the Seattle Div., respectively.

Houdaille-Hershey of Indiana, Inc.

—J. L. Montmarquet has been named export manager.

Sparks-Withington Co.—E. W. Gentz has been elected a vice-president and general manager of the Sparton Automotive Div.

Sterling Electric Motors, Inc.— Edgar K. Johnson has been named manufacturing vice-president, and John R. Eastman has been made chief engineer.

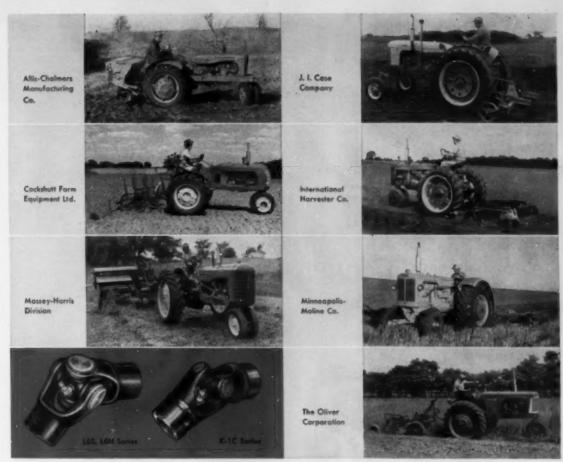
Aircraft Standards, Inc.—Edward J. Duggan was named assistant to the general manager.

Yale & Towne Mfg. Co.—John R. Henderson has been named sales manager of the new branch in Detroit, and D. K. Wirth has been named branch manager.

Aluminum Co. of America—Robert L. Williamson was made manager of pig and ingot sales, and John S. Hamilton was chosen manager of foil product sales.

Waukesha Tool Ca.
—Allen W. Salsman
has been named chief
engineer.





For easy steering through a simple assembly Leading Tractor Manufacturers provide dependable BLOOD BROTHERS Universal Joints

There are many ways to build a tractor steering assembly . . . and most of them require a means to change angularity in the steering shaft.

To assure easy steering—with dependability, simplicity and economy—leading tractor designers specify Blood Brothers Universal Joints to do the job.

On the tractor itself—as well as the drive lines for tractor-driven implements—Blood Brothers Universals deliver the lasting quality that manufacturers, dealers and farmers want.

FOR FARM IMPLEMENTS, MORE BLOOD BROTHERS UNIVERSAL JOINTS ARE USED THAN ALL OTHER MAKES COMBINED.



BLOOD BROTHERS MACHINE DIVISION

ROCKWELL SPRING AND AXLE COMPANY

ALLEGAN, MICHIGAN

UNIVERSAL JOINTS
-AND DRIVE LINE
ASSEMBLIES

METALS

(Continued from page 87)

large. Some concerns have figured it would pay them to replenish copper inventories even at 50 cents and chance lower future prices rather than to pay normal tax rates on copper used up that was carried under LIFO at perhaps 15 cents per pound.

Informed opinion exists that future price changes in copper will be downward as production catches up with demand. However, the producers' 43 cent price is likely to hold for the rest of the year. Demand is still good and buying for inventory replacement still has a long way to go.

Zinc In Strong Demand

The increase in the zinc price to 13 cents per pound was not unexpected, but when lead was boosted ½ cent to 15½ cents it caused considerable surprise in the trade and no little criticism. No consumer had suffered for lack of lead which was believed to be in adequate supply.

But when zinc was again boosted to 13½ cents by a few producers it aroused a storm of protest from the Die Casters Institute which declared in a series of telegrams to the zinc companies that this increase was further evidence of basic instability of zinc as a dependable industrial material and noted the unstable price already had repercussions with regard to 1957 automotive application.

It appears quite possible that the latest price increase will be rescinded as several large producers have signified their intentions to withdraw as gracefully as possible from a position that may become untenable.

The combined price of lead and zinc is now 29 cents a pound, which exceeds the price at which it is believed the Government will buy the metals for the stockpile. To this extent the 29 cent price is vulnerable. But if any reduction is made to attract Government buying, it seems likely that lead rather than zinc will have to retreat.

Zinc producers ascribed the price rise to higher costs for freight, fuel, supplies, and labor. No doubt these factors provided justification, but unless the actual consumer demand was there, as evidenced by vanishing stocks and larger volume of unfilled orders in producers' books, the price increase could not have been so readily accepted by consumers.

Producers of special high grade zinc needed by the die-casters report business at record levels. One leading manufacturer declared he could accept no more orders for months ahead because he had no more metal to sell. There is some talk of increasing the spread between this grade and the common variety, which now stands at 11/2 cents per pound. However, such a step would be greeted with no applause by the die casters, who are extremely price conscious, and have been vehemently calling for price stability in zinc to avoid their substituting aluminum.

Larger Aluminum Output Planned

Another 75,000 tons of aluminum, that was originally earmarked for the Government stockpile, will be diverted to industry in the fourth quarter. The Government contracts with the three principal producers call for 100,000 tons per quarter. Because of the current shortage, all the Government allotment in the third quarter was released to industry.

Three key companies are planning to proceed with expansion programs (Turn to page 109, please)









rust was formed during a 48 hour immersion in synthetic sea water. Plate (right) protected by new Sun rust-preventive grease is wholly rust free after 48 hours.

NEW GREASES PREVENT HARMFUL RUST

Sun rust-preventive greases give improved lubrication ... protect against wet or humid operating conditions



In 48 Hour Synthetic Sea Water Test, rust from plate coated with ordinary grease has turned water yellow (left). Water remains crystal clear in beaker with plate protected by new Sun rust-preventive grease (right).

Water contamination in grease-lubricated parts reduces lubricant life, promotes corrosive wear, and may lead to failure of bearing surfaces.

Sun Oil's new rust-preventive greases are specially fortified to overcome this problem. They give extra protection against both direct water contamination and indirect water contamination caused by high humidity and condensation during overnight and week-end shut downs.

Available at the price of ordinary greases, new Sun rust-preventive greases come in many different grades. For complete information, see your Sun representative, or write for Sun Technical Bulletin 38. Address Sun Oil Company, Philadelphia 3, Pa., Dept. GI-1.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO & MONTREAL



PLEASE TURN TO NEXT PAGE



New buttery grease now protects against rust under highly adverse moisture conditions.



New tacky grease prevents throw-off...reduces consumption. Highly resistant to water.



New high-temperature grease for anti-friction bearings. Exceptional stability, longer life.

NEW SUN RUST-PREVENTIVE GREASES SAVE YOU MONEY IN 3 WAYS

- * Prevent wear... and rust... on 90% of all grease jobs
- ** Serve as low-cost rust preventives for storing shop equipment
- • Save storing and handling special-purpose greases

Sun Oil Company's new greases are fortified to protect against rust. Lubricity is improved and wear is reduced because grease-lubricated parts are now protected at all times against rust and corrosion caused by condensation and process water.

The effective life of these new rust-preventive greases is approximately twice that of conventional greases operating under wet conditions. And, their extra protection against moisture permits their use as a rust-proofing medium for shop storage of tools and parts.

Competitively priced with ordinary greases, these new greases can be applied by any conventional method...brush, swab, pressure gun, or through central pressure systems.

Because of their improved quality, these new Sun greases will now perform 90% of all grease lubrication jobs. You reduce grease inventories ...lessen the risk of using the wrong grease... simplify your handling problems.

For complete information, see your Sun representative or write Sun OIL Company, Philadelphia 3, Pa., Dept. GI-2.



INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY, PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

METALS

(Continued from page 106)

to increase aluminum supply without Government support or fast tax writeoffs. Revere Copper & Brass, Kaiser Aluminum, and Reynolds Metals are set to go, with a fourth possible entrant, St. Joseph Lead in conjunction with Pittsburgh Coal, still undecided. It all adds up to the probability that the Ohio River Valley may become the leading single aluminum producing district in the United States.

Quite possibly an additional impetus was given to aluminum expansion through the wide publicity accorded to the statement by Western Electric Co., largest individual user of copper, that it was taking steps to substitute aluminum for the red metal in making cable wire. Dissatisfaction with spiraling copper prices and repeated shortages in supply have made the company move ahead with a definite engineering development program for such substitution. The company asserts that during the last three years it has produced billions of feet of conductor cable in which aluminum was substituted for copper with material savings.

BOOKS ...

FORMING OF AUSTENITIC CHROMIUM-NICKEL STAINLESS STEELS, published by International Nickel Co., Iuc., 67 Wall St., New York 5, N. Y. Price, \$5.00. A revised and expanded edition of the book, first published in 1917, showing the minute details of how to form the chromium-nickel stainless steels, in now available. Descriptions of newly developed processes, especially those using only one solid die, and their application to the forming of stainless steels are included along with detailed discussions and illustrations of older and more conventional methods. The book explains the effect of various compositions, tempers and finishes on the forming character-lattics.

WHAT'S NEW ON THE LABOR-MANAGEMENT FRONT, published by the American Management Association, 156 W. 42nd St., New York 16, N.Y. Price, \$1.75. This booklet reviews the latest developments in labor-management relations and sets forth the implications of these changes for all personnel executives. Specific problems and practical solutions, without neglecting long-range considerations, are discussed. Changes in the labor occue (mergers of unions, the development of a new species of union leader, the growing unity of the American work force), automation, employee communications, and Government action, are some of the topics covered.

3 "Pressed-In" SEALS for economy, quick installation and life long performance in all types of services

TYPE 11-A

Synthetic Rubber Bellows . Small shafts to 34 in.

Services: hot or cold water, oil, gasoline, kerosene and other liquids non-injurious to synthetic rubber.

Pressures: up to 50 psi.

Temperatures: -65°F, to +220°F, Special construction to +300°F.

Construction Dots: Packaged unit. Retainer does not contact shaft, permitting operation at a high rpm. One size can be used for several shaft sizes. Bellows encloses spring and metal parts to prevent contact with medium being sealed.



TYPE 6-A

Synthetic Rubber Bellews . Interchangeable with Type 11-A

Services: hot or cold water, oil, gasoline, soapy and other liquids non-injurious to synthetic rubber.

Pressures: up to 75 psi.

Temperatures: $-65^{\circ}F$, to $+220^{\circ}F$. Special construction to $+300^{\circ}F$.

Construction Date: Similar to Type 11-A. Does not contact shaft, permitting operation at high rpm. One size can be used for several shaft sizes. Spring and metal parts available in stainless steel or bronze.



TYPE 9-A

Sealing Members Made of Tellon* - Engineered for the particular application

Services: all chemicals, solvents, oils, corrosives and gases, hot or cold.

Pressures: to 150 psi. Balanced construction to 750 psi.

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Construction Doto: Packaged unit. Furnished in metallurgical specification best suited to the application. Chemically-inert Teflon wedge ring closely fits inner sleeve of retainer and is machine-mated to carbon scaling washer.



Contact "John Crane" for the particular seal best suited to your application. Request bulletin giving full information on "John Crane's" complete line of mechanical seals.

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CRANE PACKING COMPANY

*Du Pont trades



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Lipe A.M.L. Bur Feed Eliminates Time Losses, increases Output 30% or Mara

The Lipe Automatic Magazine-Loading Bar Feed is an air-operated attachment which holds an shour supply of bar, rod or tubing and feeds it continuously to any machine equipped with a fixed stop. There are no feed fingers to break down—nothing to scratch or mar polished stock. It will feed any length in one feed-out, thereby cutting cycle time. Remnants are ejected automatically. Idle operation ("cutting air") is eliminated.





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Send me free book on how to gear machine tools to the sheady flow of Time.

Name Title

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Automatic Setup Machines Pontiac Valves

(Continued from page 67)

zontal conveyor and are transported through a General Electric induction heating unit for hardening the tip end of the stem.

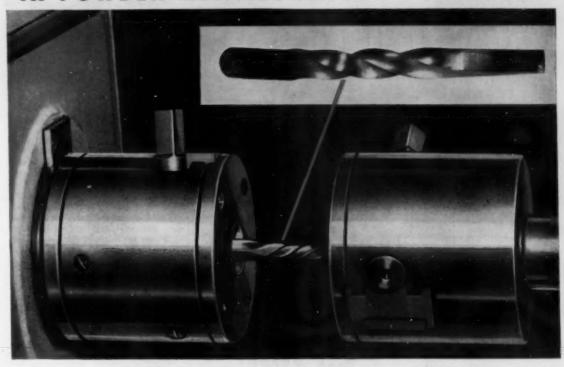
At this point the intake valves are collected in tote boxes and delivered to the finish-grinding department in another section of the plant contiguous to the cylinder head assembly line. Here the intake valves are joined by exhaust valves and are fed by automation devices to elevators serving two groups of Cincinnati Centerless grinders. Intake valves are fed to one side, exhaust valves to the other, to keep them separated through the entire process.

Following finish - grinding of the stem, the valves feed automatically into a four-lane conveyor of the large washing machine. At the exit end, the valves are collected into two chutes-one taking intake valves, the other exhaust valves-to elevators arranged to feed the two Federal electronic inspection machines. The function of these machines is to check at various stations tip hardness, overall length, stem out-of-roundness, taper and stem grinding at one station. Hardness is checked by means of a Sclerescope attachment at the first station. Here the valves are loaded automatically into an indexing fixture, arranged to turn the valve over so as to present the tip to the inspection station automatically.

As the valves leave the two inspection machines, they are transported in chutes to the loading end of an elevator for each type, then spiral downward to the first station of the cylinder head sub-assembly line. It is of interest that valves are delivered to this station along eight channels—four for intake valves, four for exhaust valves—and are picked off by the assembly operators for installation in the cylinder head.

It may be noted at this point that the network of elevators and the maze of delivery chutes, spiralling downward to the loading stations of the various machines, require a variety of safety devices to prevent malfunctioning. One essential is the provision of safety switches to stop an elevator when the feeder lines to a machine or group of machines become filled. Another is the provision of a small vibrator mechanism at various critical points of the feeder chutes to prevent stalling due to possible misalignment of valves. Generally speaking, the

IN POWDER METALLURGY ... IT'S AMPLEX



New STEEL OILITE'S unusual ductility is demonstrated in this photo of a typical torsion test. This revolutionary material was developed by Chrysler for applications requiring extreme ruggedness.

NEW Ductile STEEL OILITE Opens Up New Uses for Powder Metals

STEEL OILITE is a new and revolutionary Chrysler developed die-pressed powder metal with ductility and strength in the range of low carbon steel (elongation values up to 15%; tensile strength from 35,000 to 120,000 PSI).

Makes considerable savings possible for countless new applications; one customer reported savings of 96%. Eliminates most machining operations.

STEEL OILITE may be hardened, machined and staked using conventional methods. Developed by Chrysler-Amplex engineers, STEEL OILITE has been production and field tested for over 18 months.

The engineering facilities of Amplex and Chrysler are unmatched in the powder metal industry. They are ready to help you. Call or write today for STEEL OILITE information. Ask for Bulletin STM-54.

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- . LONGER LIFE

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NYLINED Bearings are a highly engineered thin liner of Dupont Nylon, designed to bring bearing users the many benefits of Nylon as a bearing material by solving most of the limitations surrounding its use. The compensation gap principle assures maintenance of diametral tolerances for precision applications.

Available in 4 standard types, 10 standard sizes... from stock. Other types and sizes may be inexpensively tooled for production applications. For catalog containing data on advantages, applications, standard sizes, prices, special types, load ratings, engineering information, evaluation chart, installation methods ... write to

THOMSON INDUSTRIES, Inc. DEPT. I. MANHASSET, NEW YORK facturers of BALL BUSHINGS... the Ball Boaring for Linear Mullions

great height of the elevators serves not only to provide for some storage but also to impart the initial acceleration required to move the valves without fail into the loading mechanism of the machine.

Cadillac Features Two New Body Styles

(Continued from page 100)

was introduced for the first time as a dream car at the GM Motorama and will be the first such passenger car to be available on a special production basis in the 18-year history of General Motors show car activity. The car is only 54 in, high and reveals a wide departure from conventional automotive styling and construction.

A new power brake system is standard on all 1956 models. The direct acting unit reduces pedal effort and permits the use of a wide, lower brake pedal with a reduced stroke.

Lower steering ratio with a high output power steering pump provides additional handling ease and a new in-line steering gear with modified steering linkage greatly increases directional response.

Other important refinements include new direct acting shock absorbers; improved vacuum type windshield wipers which provide equal wiping coverage under all conditions, and a new signal seeking radio which has both push button and manual tuning controls.

A new six-way power seat adjuster provides for adjusting the angle of the seat back in addition to the horizontal and vertical movement. The horizontal adjustment range has been increased to five inches.

New Packard Has 310 Hp Engine

(Continued from page 49)

slip differential transmits extra power to the rear wheels in the proportion necessary to solve an adverse driving situation and to the rear wheel where power can be used.

Power-steering for 1956 provides for faster steering with fewer wheel turns. About 10 per cent less steering effort is required for maneuvering the car.

A new seating idea features reversible seat and back cushions to provide the Packard Caribbean with an interior of genuine leather or a gilded interior of brocade cloth



Engineer "THE RIDE" WITH ...



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PRODUCTS COMPANY

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FIFTY YEARS' experience in the design and manufacture of leaf springs as original equipment on cars, trucks, buses, and trailers adds up to maximum skill in producing springs which will perform with complete satisfaction under the conditions for which they were designed.

That's why the makers of most of America's trucks use DSP Leaf Springs as original equipment.



SINCE 1904 - ORIGINAL EQUIPMENT ON CARS, TRUCKS, CABS, BUSES, TRAILERS

Plymouth Adds New V-8 Engine

(Continued from page 98)

Inside, the instrument panel is redesigned for greater convenience. The push button PowerFlite drive selector is on the left of the steering post and push buttons are illuminated for night driving.

The ammeter and oil pressure gauge have been replaced by red flasher lights between the gasoline

1956 PLYMOUTH ENGINE SPECIFICATIONS

Bore & Stroke (in.)	Displacement (cu in.)	Camp. Ratio	Max. Horsepower (rpm)	Max. Torque (rpm)
3.75 x 3.13	277	8.0 to 1	200 @ 4400	272 @ 2400
3.75 x 3.13	277	8.0 to 1	187 @ 4400	265 @ 2400
3.63 x 3.256	270	8.0 to 1	180 @ 4400	260 @ 2400
3.25 x 4.63	230	7.6 to 1	131 @ 3600	203 @ 2000
3.25 x 4.63	230	7.5 to 1	125 @ 3600	200 @ 1600
	Stroke (in.) 3.75 x 3.13 3.75 x 3.13 3.63 x 3.256 3.25 x 4.63	Stroke (in.) Displacement (cu in.) 3.75 x 3.13 277 3.75 x 3.13 277 3.63 x 3.256 270 3.25 x 4.63 230	Stroke (in.) Displacement (ou in.) Comp. Ratio 3.75 x 3.13 277 8.0 to 1 3.75 x 3.13 277 8.0 to 1 3.63 x 3.256 270 8.0 to 1 3.25 x 4.63 230 7.6 to 1	Stroke (in.) Displacement (ou in.) Comp. Ratio Horsepower (rpm) 3.75 x 3.13 277 8.0 to 1 200 @ 4400 3.75 x 3.13 277 8.0 to 1 187 @ 4400 3.63 x 3.256 270 8.0 to 1 180 @ 4400 3.25 x 4.63 230 7.6 to 1 131 @ 3600

ANOTHER Ametican FIRST
Involute teeth broached in 1200 pieces per hour

... 10 PARTS AT A

TIME!

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An indexing fixture, equipped with two loading stations and automatic clamping, is mounted on an American 3-way machine to perform this specialized high production broaching operation. While one station is broaching, the operator stacks 10 parts at the other station. The stack is automatically indexed into broaching position and then clamped. At end of the broaching stroke, the stack is indexed and discharged into a chute by an automatic air ejection unit.

The low piece cost obtained on this machine, is an example of the economies that American gives you — by supplying a machine completely tooled with work-holding fixtures and broaches.

Why not put American to work on your broaching problem. A parts print or sample will receive prompt attention. Or write for catalog 450. It is an informative manual on all phases of broaching.

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and water temperature gauges directly in front of the driver.

Optional devices, in addition to push button PowerFlite transmission, include coaxial power steering, improved power brakes, push button power front seat adjustment and push button power window regulators. Another option is a car phonograph.

Safety belts, anchored to the frame and available for both front and rear seats, are continued as optional equipment on all models.

BOOKS ...

THE NEW AMERICAN MACHINIST'S HANDBOOK, edited by Repert LeGrand, published by McGrosc-Hill Book Co., 316 W. §2nd St., New York 36, N. Y. Price, \$11.00. A valuable aid to machinists, designers, draftsmen, and engineers, this one volume provides a storehouse of useful tables and formulas, plus a convenient-sized encyclopedia of up-to-the-minute information on modern metalworking methods, material, and equipment. All the processes involved in manufacturing a metal product—from raw stock to the final result—are covered in detail. The handbook makes instantly available a wealth of data on machining, metal forming, assembly, metals finishing, inspection, fastening devices, tool engineering and drafting, machine tool standards, and power transmission, plus mathematics and tables.

BRAND OF THE TARTAN, by Virginia Huck, published by Appleton-Century-Crofts, Inc., 35 W. 32nd 81., New York, N. Y. Price, \$3.50. The story behind a group of products that solved production problems for automobile manufacturers and helped the entire industry grow are told here. This 250-page book traces the history of 53-year-old Minnesota Mining and Manufacturing Co., developers of abrasive paper, masking tape, special adhesives, and abrasive disca used throughout the automotive industry. The continuous flow of such products stems from the same qualities—imaginative research, venturesome capital, and progressive management—that have made the company a classic example of free enterprise in action, the book says. It calls these characteristics the key to its evolution from a small mining concern to a large, diversified manufacturing enterprise.

DIE LIFE

WCREASED

Heating for forging 1° stainless bex-bead machine ball blanks with 01,000 cycle TOCC Induction Heating Unit. Photo—coarrier Tock Off the Harper Co.

with TOCCO' Induction Heating

Naval Bronze, Silicon Bronze, Copper, Aluminum, Monel and all types of stainless steel are heated for forging at the H. M. Harper Co., Morton Grove, Illinois. Regardless of material TOCCO can be profitably applied to brazing, heat-treating and forging operations in almost any metal-working plant.

PRODUCTION UP—In addition to the very important savings in forging dies, TOCCO has increased production to as much as 265% of output possible with former heating methods. On the 1" type 303 Stainless machine bolt blanks

shown here TOCCO upped production from 75 to 200 parts per hour, using 35 K.W., 10,000 cycles.

VERSATILE – The same TOCCO machine is used on stock of %" to 1%" diameter; heated zones vary from ½" to 4". TOCCO'S automatic timing cycles provide complete uniformity of heating throughout both length and cross section—assuring a uniformly high quality product.

Why not have a TOCCO Engineer investigate your plant to determine where TOCCO can cut your costs and streamline your production?

THE OHIO CRANKSHAFT COMPANY

NEW FREE
BULLETIN

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Arm-weary tractor operators are grateful for TD-14A and TD-18A International Harvester crawlers. They steer with the ease of a late model car for each track is controlled by its own hydraulic circuit...a booster system with velvet smooth, positive action that stems from

HYDRECO Oil Power

Here is a HYDRECO dual pump that delivers 5 gpm to each circuit at 1200 rpm against a system pressure of 700 psi. The dual pump provides a circuit for each track and the result . . . no arm-weary operators . . . more accomplished with less effort, in less time . . . smoother, higher performance . . . lower maintenance.

For engineers seeking practical answers to problems of trouble-free hydraulic controls, better performance, added functions and greater sales appeal for mobile equipment, the experience of HYDRECO engineers offers a definite answer!

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HYDRECO DIVISION THE NEW YORK AIR BRAKE COMPANY

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One Size Engine for All New Buicks

(Continued from page 51)

three degrees later. On synchromesh cars, exhaust valves open five degrees earlier. Exhaust valve lift is increased to 0.378 in. The exhaust valve now has a tulip-shaped head.

Dynaflow design has been modified by the addition of a second stator assembly in the torque converter to improve acceleration. Oil channels have been so revised that low stator blade angle occurs in all ranges.

A new heavy duty manual shift transmission now is standard equipment on Series 40 cars. It is the same as the unit used in 1955 Series 50 and 60, except for the length of the main shaft and rear bearing retainer.

Front end suspension has been vastly improved by changing kingpin inclination from zero to seven deg.

Drive elements and rear axle have been redesigned and improved. For one thing the torque ball is a malleable casting to which rubber sections are bonded and compressed between steel cup retainers to provide a leak proof, flexible pilot. In addition, a heavy steel-backed bronze universal joint bushing is used. The rear coupling, in turn, has angular axial freedom of movement in the spline, serving as a universal joint of limited travel, and is grease lubricated.

One of the chief features of the new rear axie is the provision of a vane type oil pump mounted outboard on the right pedestal of the differential carrier. It draws oil from the sump and jets it at high velocity at the oncoming side of the gear teeth. This pump is supplied only on Series 70 cars.

Strut rods now are insulated, connected at the torque tube bracket by a rubber-insulated compression bushing through a forged eye at each end. Direct acting shock absorbers have been installed on all models.

On the brake system, the power brake cylinder, relocated on the toe board, utilizes a ratio of 1.5 to 1. The master brake cylinder, mounted on the toe board, is of displacement type. Width of Series 40 rear brake linings has been upped to 2.25 in. Brake shoes and linings all have a central groove along the shoe to relieve the high pressure zone under the shoe web.

One of the major design changes is found in the new Saginaw power steering gear. It is of much lighter



... for ENAMELS . LACQUER . PAINT .



MANON LOUP SHIELD IN YOU SELATELY VALUE to YOU SELATELY VALUE to YOU

One of Four Mahon TYPE 54 AC-F PUMPLESS Hydro-Filler Spray Booths installed in the Parceloin Ename! Finding Line of the some

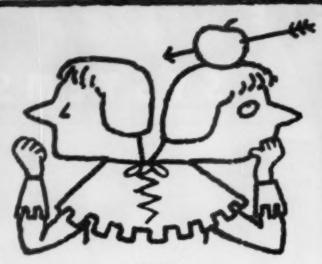


PUMPLESS Hydro-Filter SPRAY BOOTH is Highly Successful in FRIT SPRAYING OPERATIONS!

Mahon Type 54 AC-F Hydro-Filter Spray Booth, designed especially for Frit Spraying in porcelain enameling operations, is a departure from the conventional water-wash spray booth. There are no recirculating pumps. The normal exhaust fan, used to ventilate the spray booth, provides the washing action through air accelerators which impinge the airborne frit particles into the surface of the water in the sludge tank. Dry baffle plates are provided in front of the Hydro-Filter chamber for maximum recovery of Frit. The bottom of the sludge tank is in the form of two "V" shaped hoppers with the continuous conveyor of the automatic sludge unloader at the bottom. In the development of Type 54 AC-F, Mahon engineers have not only produced a highly effective Frit Booth, but, through elimination of high pressure pumps and the addition of the automatic sludge unloader, have reduced operating cost and maintenance to an absolute minimum. If you have a finishing problem, or are contemplating new finishing equipment, you will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified, also, to do the all-important planning and engineering of equipment—which is the key to fine finishes at minimum cost. No matter what you paint, or by what process, Mahon equipment will serve you better . . . because its engineered better and built better for more economical operation over a longer period of time. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-656.

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oplete Pinishing Systems—including Metal Cleaning, Pickling, Spray Booths, Dip and Plow Coaters, Pittered Air Supply Sys-coling Tunnols, Neat Tracting and Quenching Equipment I Jum, and other Units of Special Production Equipment



OFTEN

TWO HEADS ARE BETTER THAN ONE



Sometimes two heads are the only solution to a part or fastener problem. Take a quick look at the belt buckle roller illustrated. This was a really special job and it solved a special problem for both the Armed Services and their suppliers. The big problem here was to produce this roller in quantity, inexpensively and quickly... and HASSALL double-heading did the trick.

Double-heading is only one example of the almost limitless possibilities Hassall cold-heading offers you. If you have a fastener problem just send us samples or specifications for a quotation.

WRITE FOR CATALOG . . . with it we will send our popular decimal equivalent wall chart.

John Hassall, Inc., Box 2194, Westbury, L. I., N. Y.

HASSALL

SINCE 1850



NAILS, RIVETS, SCREWS AND OTHER COLD-HEADED FASTENERS AND SPECIALTIES weight than before, simpler in design, and features considerably fewer parts. Offered as standard equipment on Series 50 and 70 cars, it is of in-line type with the ball nut, worm, and steering shaft concentrically located within the piston. It has a ratio of 17.5 to 1 with increased power capacity. The hydraulic oil serves also as the lubricant. The gear is provided with a fabric disk flexible coupling in the steering shaft to absorb small misalignments, to prevent transfer of gear and hydraulic noises, and to simplify maintenance.

Manual linkage remains unchanged except for the pitman arm which has the block teeth location changed to fit an overall steering ratio of 25.8 to 1.

The steering control valve in the new Saginaw power steering gear is mounted on top of the housing, ported in such fashion that oil is directed to either end of the piston through internal passages in the housing. A linkage arrangement permits the thrust action in the worm and nut assembly to be translated to the valve through a 2.5 to 1 ratio lever, making valve action more sensitive. Valve design incorporates a centering spring for the spool. It is of interest that the new power gear takes hold upon application of only 2%-lb effort on the rim of the steering wheel.

An improved air conditioning system is available as optional equipment, the entire unit being installed under the hood. Designed to supply all-weather comfort, the new system has the cooling core mounted ahead of the combined heater and defroster core. Thus air entering the passenger compartment can be cooled, heated, or used as ventilating air. The condenser is installed in front of the radiator, while the evaporator is mounted in the right half of the fire wall. The compressor is mounted on the right hand side of the engine.

The heater and defroster unit is entirely new, located below the instrument panel. It has a new heater housing and core, and provides 40 per cent more heating capacity than the former unit. It is arranged to use only heated outside air instead of recirculating air as before.

Increased rigidity has been imparted to frames on Series 40 and 60 sedan and Riviera models by increasing stock thickness. Additional rigidity on the convertible has been effected by increasing stock thickness of the center cross member extensions and side rails.

A new six-way power-operated front seat adjustment is available as a facFor Multiple Grinding

specify

SIMONDS ABRASIVE CO.

grinding wheels in MATCHED SETS





The crankshaft grinding operation illustrated here is typical of the production economies possible with "matched sets" of Simonds Grinding Wheels in multiple set-ups.

These wheels are furnished in counterbalanced sets, each wheel identified by set number, and painted on the face with a red stripe for accurate line-up on the spindle. Matched for best balance, these sets give more uniform grinding action, better and more production.

If you grind cylindrical parts requiring more than one diameter, investigate multiple wheel set-ups. A Simonds Abrasive Engineer will be glad to help you in determining the specification and recommended procedures for your job. Write for this service today.

SIMONDS ABRASIVE COMPANY . PHILADELPHIA 37, PA.

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EASY-FLO and SIL-FOS



variety of metal joining jobs with these low-temperature silver brazing alloys. Simply use a fast heating method and a setup that promotes fast handling of parts. In that way you get full benefit of the remarkably fast brazing of strong, virtually indestructible joints inherent in the exclusive composition and properties of EASY-FLO and SIL-FOS. Take this job for example — brazing one-piece stamped pulleys to shafts:

One girl slips pulleys onto shafts and applies HANDY FLUX. The other puts a ring of EASY-FLO 45 wire on top of each assembly.

Assemblies with preplaced allay rings, are put in fixtures which accurately position pulleys, and are brazed automatically by induction heating.





Heating time for 2 assemblies is 25 seconds. Production per 8hour shift is 1500. Assemblies are tested to 4000-lb. pull.

Photos and data courtesy of Zatko Metal Products Co. Euclid, Obio







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Banaral Offices: 82 Fulton St., New York 38, N. Y. DISTRIBUTORS IN PRINCIPAL CITIES OFFICES and FLASE! SAIDGEPOST, COMM. FROWINGHICS, & 6. CHICAGO, ILL. CLIVELAND, DAND BETROIT, MICR. 205 ANGELES, CALIF. TOROUTO, CAMADO. CRITICAL CAMADO.

There's no ". . . or equal" for EASY-FLO and SIL-FOS

tory installed option on all models except the 48. It provides horizontal, vertical and seat tilt adjustment, horizontal travel being five inches.

Oldsmobile for 1956

(Continued from page 71)

be found on page 62 of this issue. Among the safety devices are inter-lock door locks, introduced in 1955 to reduce the possibility of doors unlatching under impact, and the new "safety-aim" sealed beam headlights. These more powerful headlamps extend about 80 feet further down the road on low beam, which is so aimed that it concentrates light on the right shoulder of the road. Seat belts are being offered as optional equipment.

Among the optional accessories for 1956 are the new automatic six-way front seat and the dual exhaust system. The electric-powered six-way seat adds new tilting positions forward and backward to the familiar fore-and-aft and up-and-down movements. Also in 98 Holiday coupe and Starfire models, the front seat automatically slides back for easier front seat entry when the door is opened and slides forward for easier rear seat entry when the seat back is tilted forward. The new dual exhausts are integrated in the new rear bumper design, just below and outside the bumper guards.

Power steering, standard on the 98 and optional at extra cost on other series, has been improved through a smoother cut-in of the steering assist when pressure is applied to the wheel and a flexible coupling that minimizes road vibration. The steering ratio has been reduced 10 per cent.

The Rocket engine has undergone several revisions to improve power and performance. Breathing properties of the engine have been increased through the use of a higher lift camshaft, larger valves and revised ports in the cylinder head, a new Quadri-jet carburetor incorporating an air valve and larger venturis and a new intake manifold with a T-branch contour.

A new distributor provides better accuracy of ignition timing and external access to the breaker points for service setting. New valve lifters and improved valve and rocker arm oiling reduce valve noise. A new design ribbed spark plug is used to reduce external spark leaking tendencies.

The capacity of the heating system



Cold drawn Shelby Seamless Tubes provide high strength, low weight outrigger struts for B-47 Stratojet



The landing gear of the 100-ton B-47 Stratojet consists of dual main wheels in tandem with single outriggers attached to the inboard engine pods. The outer cylinder of each of the outrigger struts is fabricated from cold drawn USS Shelby Mechanical Tubing.

Shelby Seamless is extremely strong and shock absorbent in proportion to its weight. Thus, it is ideal for incorporation into landing gears, engine mounts, longerons, wing spars, fuselage struts, and tail assemblies. Moreover, with Shelby Seamless Tubing, the basic shape for myriad aircraft parts is already made—and each section of tubing is as sound as the solid steel forging from which it is pierced. Thoroughly uniform and dimensionally accurate, Shelby Seamless Tubing is easy to bend, shape, machine and world.

Shelby Seamless is produced to exacting aircraft standards, in a wide range of diameters, wall thicknesses and steel analyses. For further information or for help in applying Shelby Seamless Mechanical Tubing to your design specifications, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



"WALLS WITHOUT WELDS,"
the vivid story of the manufacture of National Seamless Pipe
and Tubes is available free of
charge for showing to industrial
groups, clubs, school groups, etc.
This educational sound film in
brilliant technicolor contains
some of the most dramatic steel
mill operations ever recorded.
Write for information.



NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

(Tubing Specialities)

COLUMBIA-GENEVA STEEL DIVISION, SAM FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



SHELBY SEAMLESS MECHANICAL TUBING



has been increased and the capacity of the refrigerating system has been increased, particularly at moderate driving speeds.

A foot-sperated parking brake to

the left of the driver replaces the former hand brake. This brake, with its suspended pedal, requires only 60 to 65 lb of pressure to apply compared to 80-85 lb with the old brake.

Balancing Automatic Transmission Parts

(Continued from page 70)

amount of unbalance upon completion of the unbalance measuring.

 Idle station—Required to reduce the transfer time between the other stations. 5. Inspect station—The accuracy of balance is checked automatically. During this operation, the assembly is completely filled with oil.

6. De-bolt or reject-If the part is

not within tolerance, it is placed on the reject conveyor. If it is within tolerance, the four bolts holding the assembly together are removed preparatory to disassembly. Tight dowel pins between the two parts of the assembly still hold them together.

7. Split, drain, strip O-ring and transfer to washer—The two major parts of the sub-assembly are pulled apart, the fit of the dowel pins being the force tending to hold them together after the bolts are removed. An O-ring seal is removed from a projection on one of the parts, and the two major members, flywheel and torus, are placed ir position to be passed through the washer.

8. Wash, rinse, and blow-off — The individual parts of the assembly are carried in pairs of baskets through a wash, rinse, and blow-off. The basket pairs assure pairing of mating parts at final assembly.

It may be noted at this point that the technique can be applied to a variety of parts requiring differing procedures. For example, equipment has been built for balancing flywheels; fiex plates for automatic transmissions; and one proposal covers a complete balancing procedure with integrated loading and unloading for balancing a variety of small armature assemblies. Depending upon the nature of the work, balancing may be accomplished by welding a suitable strip or washer, by drilling, or milling.

An unusual feature of the equipment is the provision of a special monitoring device that constitutes a check on the final inspection station. If the latter fails to perform the machine is caused to stop.

In some cases manufacturing economy or design requirements may make it impractical to complete the maximum correction in a single pass. In such instances, the machine applies a maximum correction slightly off the exact angular location. Then when the part is presented for rebalance, the final correction can be made at another point.

In general, where automatic work handling is applied to the equipment, the transfer can be made at an average linear speed of 30 fpm.

For the benefit of our readers we might mention that the applications described above will be covered more thoroughly when the customer's plant is covered in an appropriate issue of AUTOMOTIVE INDUSTRIES in the near future.

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Easy Starting! Perfect Idling! Economy! CENTURY GAS EQUIPMENT CO. 11188 Long Beach Blvd., Lynwood, Calif.

IDLES PERFECTLY.

GIVES INSTANT POWER—no choking or fluttering.

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PERFORMS AT ALL speeds to pre-set perfection.

BALANCES POWER of each cylinder.

4140 steel is your best bet

for light and heavy sections

AISI-SAE 4140

C Mn Pmax Smax 0.38/0.43 0.75/1.00 0.040 0.040 Si Cr Mo 0.20/0.35 0.80/1.10 0.15/0.25

4100 steels are your best bet

Chromium Molybdenum Steel like AISI-SAE 4140
is doing a job economically in both light and heavy
sections. Whether in the equipment that drills an oil well—
or bolts for a thousand uses, plentiful 4100 Moly
steel does a better job. We can show you how
Climax Molybdenum Company, 500 Fifth Avenue,

New York 36, N. Y.



CLIMAX MOLYBDENUM





Industry use of fast tax amortization as an aid to expanding production, will be virtually a thing of the past by the end of this year. Of the 226 goals originally set, only 32 still remain open.

Government now has about \$5.6 billion worth of minerals and metals in its stockpiles. This is slightly more than half of what is eventually planned.

Representatives of manufacturing concerns making internal combustion engines are going to work with the Defense Dept. and the Business and Defense Services Administration. Purpose is to try to determine mobilization requirements for the industry.

Government outlays for defense will stay high in 1956. They will do so despite attempts of economy advocates to trim as much as \$1 billion from the total \$34.5 billion total military budget.

Production of equipment for the Air Force is running steadily at about \$6 billion to \$7 billion worth annually. The Air Force apparently wants to keep it that way for several years.

Street and highway building and maintenance cost state and local governments \$5.5 billion in fiscal 1954, Census Bureau reports. Total state-local spending in the fiscal year was \$36.6 billion.

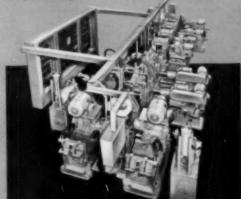
Engineers will tackle the problems involved in developing an atomic-power airplane engine at a new research center to be built by the Government in northern Ohio. Design work is progressing on the \$4.5 million nuclear reactor to be operated by the National Advisory Committee for Aeronautics near Sandusky, O. AUTOMATION in 91 station,
182 operation, in-line transfer machine
features four segments which can
operate independently or as a unit to
assure continuous production of automotive automatic transmission cases at
100 cases an hour at 80% efficiency

SNYDER

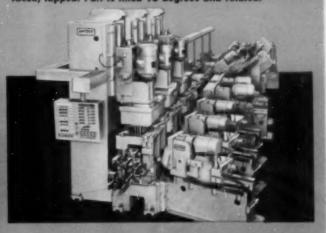
TOOL & ENGINEERING COMPANY 3400 E. LAFAYETTE, DETROIT 7, MICHIGAN

30 Years of Successful Cooperation with Leading American Industries

SEGMENT 1: 40 feet long, 19 stations, 10 spindles. Part manually loaded, both ends face milled, counterbored, three diameters rough and finish bored and faced, two pads side milled, pump pad face milled, clearance slot milled. Part tilled 90 degrees in processing.



SEGMENT 2: 47 feet long, 31 stations, 91 spindles. In top face, end and at angular locations inside, 51 holes are drilled, countersunk, semi-finish and finish reamed, spatfaced, topped. Part is tilted 90 degrees and related.





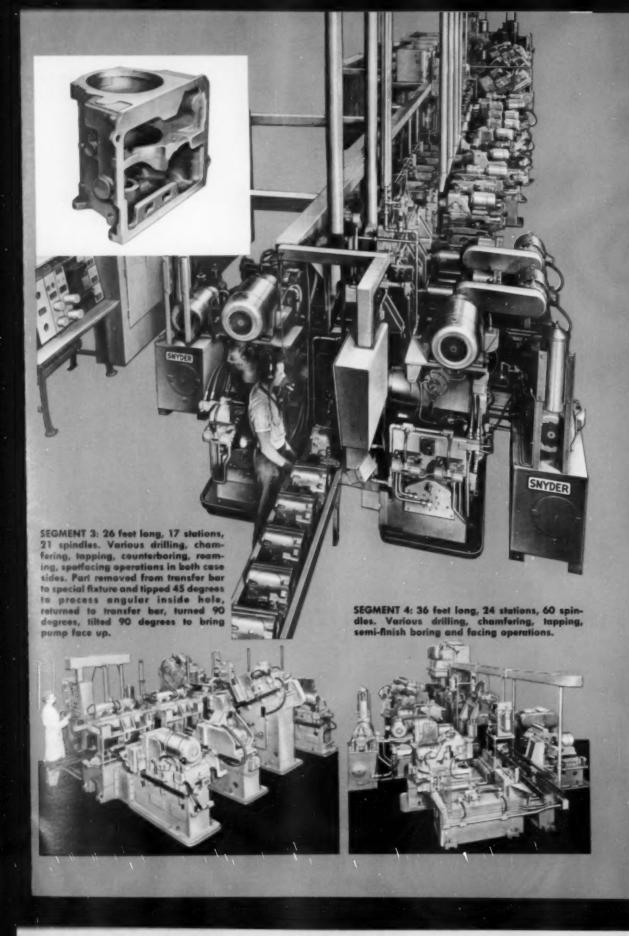
SNYDER TOOL and ENGINEERING COMPANY





As a fitting climax to our thirtieth anniversary year, we are happy to announce plant expansions which will add about one third to our machine shop and assembly floor areas and which will enable us to add to our precision machining equipment and accommodate more manpower. We are happy, too, to take this opportunity to thank all our friends who have made this modern plant possible—our customers, our suppliers and all of the hundreds of members of the Snyder family of workers, here and throughout the country.





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EM

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General Manufacturing Co., Inc. 1957 Plant St. Middletown, U.S.A.

Att.: Chief Design Engineer

Dear Sir:

Here's something new ...

Now you can have bright anodized aluminum parts that match chrome plate almost exactly for brilliance, color and tone.

Or you can have these parts in rich golds, peacock blues, deep crimsons...any color or tone you wish...with lusters from a bright high polish to a soft satin. No chipping. No peeling. Top notch resistance to wear, weather, corrosion.

You can have any aluminum part bright anodized, whether stamped, forged, drawn, or extruded.

Already designers are seizing the idea ...

For instance, gay frames for eyeglasses are now bright anodized. So are exciting new coffee makers...and a number of colorful houseware items.

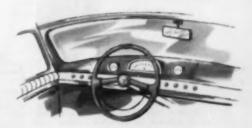
That's only the beginning. Bright anodized aluminum is replacing heavy chrome plated grilles in several style-setting new automobile models now in production or planned. The blend with chromed body trim and bumpers is said to be perfect...cost and front-end weight much lower.

CHIP-PROOF FINISH

ACID RESISTANT AND NON-FADING

Maybe this will answer that problem we discussed at lunch yesterday.





BLEND WITH INTERIOR UPHOLSTERY

In the appliance field, one leading range maker is bright anodizing control knobs and emblems. And bright anodizing is also being used to re-style refrigerator and other kitchen appliance hardware ... in color.

So it goes. Think what might be done to give dash boards new dash! And maybe we'll soon see a car "gold-trimmed" throughout. We've sketched other possibilities and you'll think of more -- instrument bezels, tubular furniture, window frames, perhaps. TV sets? Cameras?

And your products? Doehler-Jarvis is ready to stamp, forge, extrude, or draw aluminum parts and bright anodize them for you. Maybe, too, we can give an "assist" on design.

A Doehler-Jarvis sales engineer will be glad to meet with you anytime. Just say the word.

NON-TARNISHING

Sincerely,

Doehler-Jarvis Division National Lead Company



RAINBOW-WIDE COLORS



RICH APPEARANCE



NON PEELING

DOEHLER-JARVIS DIV. OF NATIONAL LEAD COMPANY TOLEDO 1, OHIO

CALENDAR

OF COMING SHOWS AND MEETINGS

Fifth Transport Aircraft Hydraulic Conference, Park Shelton Hotel, Detroit, Mich. Nov. 2-2 National Fluid Power Association, Fall meeting, Edgewater Beach Hotel, Chicago, Ill. . . . No SAE Golden Anniversary National Diesel Engine Meeting, Hotel ... Nov. 2-4 Chase, St. Louis, Mo. Nov. 2-4 Institute of Aeronautical Sciences and Canadian Aeronautical Institute, joint meeting, Ottawa Canada Nov. 2-4
National Tool and Die Manufacturers Association Convention,
Statler Hotel, Detroit, Mich. Nov. 2-6
SAE Golden Anniversary Fuels and
Lubricants Mecting, BellevueStratford Hotel, Philadelphia, Canada Nov. 3-4 Meeting, Congress, Conrad Hil-ton, and Sheraton-Blackstone Hotels, Chicago, Ill. Nov. and International Automation Hotels, Chicago, Ill. Nov. 13-18 and International Automation Exposition, Navy Pier, Chicago, ... Nov. 14-17 American Petroleum Institute, an-nual meeting, San Francisco, ASQC Mid-West Conference Schroeder Hotel, Milwaukee, Wis. Industry Exposition, Audito-rium, Atlantic City, N. J. SPI Film, Sheeting, and Coated Fabrice Div. Conference, Hotel Commodore, New York, N. Y., Dec. 6-7 International Atomic Exposition, Public Auditorium, Cleveland, O.

Material Handling Institute, annuar meeting, Statler Hotel, New York, N. Y. Dec. 12-13

Nuclear Engineering and Science Congress. Public Auditorium, Cleveland, O. Dec. 12-16

1956

Material Handling Institute, annual

Dec. 10-16

Chicago Automobile Show, Chicago, III. Jan. 7-15
SAE Annual Meeting, SheratonCadillac and Statler Hotels, Detroit, Mich. Jan. 9-12
Society of Plastics Engineers, annual conference, Hotel Statler,
Cleveland O. nual conference, note Jan. 18-30 Cleveland, O. Jan. 18-30 AIEE Winter General Meeting, Ho-tel Statler, New York, N. Y. Jan. 30-Feb. 2 Automotive Accessories Mfgrs. of America Exposition, Navy Pier,

SPI Reinforced Plastics Div. Conference, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J. Feb. 2-9 Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. Feb. 28-26 SAE National Passenger Car. Body, and Materials Meeting, Hotel Statler, Detroit, Mich. Mar. 6-8 Geneva Automobile Show, Switzer-land

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FLEXON



Lincoln and Mercury Solve Heat and Noise Problem with Flexon Metal Hose



FLEXONICS-One dependable source for every flexible metal hose requirement.

Flexonics Corporation offers the most complete line of flexible metal hase including carrugated, interlacked, square locked and dauble-groove types in steel, brass, stainless steel and other allays



Catalog 147 gives specifications and application data on all types of Plexon metal bose. Write for

The problem of heat and noise shielding along the exhaust pipe in modern high-performance engines has been solved by the Lincoln and Mercury Divisions of Ford Motor Co. They have done it with Flexon interlocked metal hose, Type RT-6, in galvanized steel. The hose is used as a shroud over the manifold pipe between the exhaust manifold and the muffler as the illustration above shows. Installed in this manner, it serves to break the sound build-up on the pipe and radiation of heat, thereby contributing to the comfort demanded by discriminating car buyers.

This is just one of the many ways in which flexible metal hose and tubing can serve the automotive industry. Flexonics Corporation's multi-plant operation and 53 years' manufacturing experience and application know-how makes it your best source for all your flexible metal hose and tubing requirements.

This experience and know-how is available to amist you. For specific recommendations, send an outline of your requirements.

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Manufacturers of flexible metal hase and conduit, expansion joints, metallic bellows and assemblies of these components. in Canada: Flexenics Corporation of Conada, Ltd., Brompton, Ontario



Briefly, it means that Hercules manufactures engines to meet the customer's requirements. These engines are produced by modern methods and each engine is tailored to fit the equipment which it will power.

The wide selection of engine sizes in the Hercules line, plus the flexibility of our production facilities enable us to specialize in building engines to meet the customers needs. We have over 90 different basic engine models, ranging from 3 to 500 H.P., available for operation on gasoline, diesel fuel, L.P.G., natural gas and kerosene.

Further, it is our policy to work with customers and to help them select the type of engine best suited for their equipment. We do more than merely suggest the use of a standard type engine. Hercules engineers work with the product engineers to select an engine with accessories and other engine components modified or positioned to fit the requirements of the end product. After these engineering problems are solved and the test engine has proved itself, our production of these engines is scheduled to meet your delivery requirements.

Whether your engine requirements are for 1 or 1001, specify Hercules Engines, the product of Engine Specialists Since 1915.



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HERCULES MOTORS CORPORATION

40 Years of Engines for Industry

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There is sufficient air conditioning capacity in each B-47 bomber to air condition five five-room houses. The heat required for the plane's cabin heating and de-icing system would heat 22 five-room houses.

If the cellophane used by one car manufacturer for wrapping motors and stators during one year's operation were made into a bag, it would be large enough to hold the City of Detroit inside.

More than 830 miles of tubing are used each year in the manufacture of car heaters by one producer.

The noise of the discharge of static electricity heard occasionally in automobile radios represents the harmless dissipation of a static charge of some 20,000 to 25,000 volts developed by tire-to-road friction.

The tapered wing-covering of new jet aircraft is ten times thicker than the aluminum sheets used in World War II planes.

Four hundred electric motors, generators, and other rotating electrical machines are required to operate various systems of one heavy bomber.

Between World War I and World War II, the speed of aircraft increased at an average annual rate of about 15 mph. Since 1947, the average annual speed increase has been 165 mph.

One tenth of U. S. families own 65 per cent of all family-held liquid assets. The next two-tenths of families own 27 per cent; the next three-tenths of families own eight per cent; the bottom four-tenths of families own less than one per cent.



Styling unlimited! WITH GRILLES IN GOLD OR SILVER

By magic of anodized finish, a grille of aluminum can be given the gleam of precious metals, the luster of brushed satin, or brilliant built-in color.

Yet, this metal of a thousand faces is a practical metal. Aluminum is versatile—it can be cast, stamped, drawn, extruded, forged. Light weight, easy to form, machine and buff, it costs less per finished part in many cases than parts of stainless steel or chrome.

Alcoa does not make grille components. We do offer you unequaled technical guidance in fabricating and finishing aluminum. To make use of this service, contact the nearest Alcoa asles office. For useful design data, write for our new, free 48-page brochure, Finishes for Alcoa Aluminum. Address: Aluminum Company of America, 1841-L Alcoa Building, Pittaburgh 19, Pa.

 Bumper bars in chromiumplated, lightweight aluminum castings

Your Guide to Aluminum Value



Frankfort Show Reveals Vast Growth of German Automobile Industry

(Continued from page 61)

power through a three-speed gearbox and a drive shaft to the rear wheels. The front assembly has a transverse tube welded to the central tube, carrying the rack and pinion steering, and support arms. Four passengers may be carried within the 80 in. wheelbase; baggage space is ahead of the front wheels. Curb weight is 1230 lb. and the price is approximately \$600.

Rather more elaborate, the Goggomobil has a central chassis frame tube, a sheet metal platform with welded wheel arches forming one unit and at the rear a parallel twin twostroke engine of 18.2 cu in., which is cooled by a fan driven off the crankshaft. Wheelbase is 70.8 in. and carrying capacity two adults and two children.

Mechanically the Spatz came into the same general class, with a rear mounted, single-cylinder, aircooled Fichtel & Sachs engine of 12 cu in. A feature was an open plastic body made in two moldings bolted together. Dornier overcame the entrance difficulty generally encountered on a short wheelbase car by placing the seats back-to-back and hinging the front and the rear panels, the full width of the vehicle, along the top, thus giving doors the full width of the car. All metal construction is used and weight is down to 820 lb.

Three prototype jeeps were presented by Porsche, Goliath and D. K. W. Compared with American jeeps they have very small engines, the D. K. W. being a three-cylinder of only 54.9 cu in., the Goliath a vertical twin, two-stroke of 54 cu in., and the Porsche an aircooled four of 81½ cu in.

In the truck section Diesels had practically a monopoly and sizes as low as 30 cu in, were shown for stationary or tractor work. Hanomag presented a new four cylinder 170 cu in. Diesel with Roots type blower. The supercharger speed is 3500 rpm for the 2800 rpm at which the engine developed 65 hp. This power plant was fitted in a 21/2 ton truck chassis. MAN presented an all aluminum V-8 of 710 cu in. supplied both with and without a Roots type blower. The output is 180 hp without blower, increasing with the blower to 240 hp. MAN is applying the "M" type combustion chamber, introduced a year ago, to all models. The main feature of this is a hemispheric combustion chamber in the piston crown, shrouded valves and a twin orifice nozzle.

Krupp presented a series of vertical four and six cylinder, two-stroke engines with belt-driven Roots type blowers. This firm showed a method of using the engine as a brake by altering the camshaft setting manually. Fuel injection is cut off and exhaust valves are opened as the piston reaches top dead center.

With the exception of Bussing, comparatively little attention seems to be paid by German makers to underfloor engines. This firm had a series of flat sixes mounted centrally under the frame, both for passenger and truck service, and the only vertical engine shown was a six cylinder in a 7½ ton truck. Henschel had a series of three flat sixes developing 125, 158 and 210 hp and an equal number of vertical



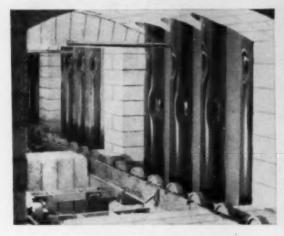
- Automatic Indication of Angle and amount of unbalance with the Elec®dyne system—an Olsen exclusive.
- Simplified Operation. Operator merely inserts the part and starts the machine. In a matter of seconds he knows the amount and angle of unbalance in the planes of correction.
- Positive Plane Separation. Exclusive Tinius Olsen pivoted cradle design assures complete, positive plane separation. The Elec@dyne only indicates the unbalance in the selected plane of correction. Rapid acting plane of correction selector speeds balancing operation.
- Simplicity of Calibration. Both the Angle and Amount meters can be calibrated quickly with the aid of a screw driver.
- Production Line Balancing is a reality with an Olsen Elec&dyne—your best investment for rapid, accurate and low cost balancing.

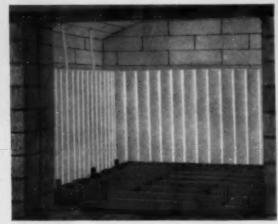
Bulletin 49 contains details on the complete line of Olsen static, dynamic and automatic Elec#dyne balancing machines. Write for your copy.



TINIUS OLSEN TESTING MACHINE CO. 2090 Easton Road - Willow Grove, Pa. Testing & Balancing Machines Whatever your source of heat ...

LINDBERG HEAT TREATING FURNACES OFFER THESE EXCLUSIVE ADVANTAGES





... IN THE GAS-FIRED FURNACE NEW LINDBERG VERTICAL RADIANT TUBE

Because of its revolutionary design, this tube provides a new level of gas-fired furnace performance. The secret lies in the new Lindberg tube's "dimples." The tube carries a central stream of mixed air-and-gas surrounded by a cylindrical stream of air alone. Combustion occurs in the area between these two streams. The "dimples" create eddies accelerating combustion and maintaining even temperatures along the entire tube.

This Lindberg tube will operate at maximum efficiency for a longer period of time. The special protective coating gives greatest possible resistance to carbon penetration. Vertical position eliminates soot deposit and resultant temperature increases at points of sooting.

Tubes are 59 inches long, weigh only 29 pounds, changeable in a few minutes. No costly furnace shutdowns nor high labor and material cost for tube changes.

... IN THE ELECTRIC FURNACE NEW LINDBERG CORRTHERM ELEMENT

CORRTHERM, Lindberg's radically advanced new electric heating element offers advantages never before available for heat treating furnaces. With this new element carburizing and carbonitriding with electricity becomes practical, efficient and economical. Ideal, too, in other types of Lindberg electric furnaces.

The outstanding feature of the CORRTHERM element is the extremely low voltage at which it operates. Consequently, leakage through carbon saturation and shock or short hazards are eliminated. Elements also act as baffles to direct circulation of convection streams.

CORRTHERM elements are practically indestructible. Work load or operator's charging tool can't hurt them. Watts density is at all time low. Easily installed or replaced, too, as element merely hangs in furnace and no complicated mountings are required.

Lindberg Field representatives in 21 cities are ready to show you how Lindberg furnaces with these revolutionary new elements can improve your heat treating process. You'll find your Lindberg representative's name in the classified section of the phone book or write us direct.



LINDBERG ENGINEERING COMPANY

2491 W. Hubbard Street • Chicago 12, Illinois

TUTHILL SIMPLIFIES PUMP SELECTION

New Cataloging Plan Provides Practical Short-Cuts to Pump Specifications — Helps You Pick The Right Pump for the Purpose

• HYDRAULIC SERVICE
• COOLANT
• TRANSFER
• CIRCULATING

In capacities from 5 to 200 g.p.m. and pressures up to 400 p.s.i.

Tuthill Catalog

Catalog 103 covers the Model CK ball bearing series of rotary, internal-gear



TUTHILL PUMP COMPANY

positive displacement pumps.

939 East 95th Street, Chicago 19, Illinois

Canadian Affiliate: Ingersoll Machine & Tool Co., Ltd. . Ingersoll, Ontario, Canada

engines of the same power. Magirus-Deutz had a range of aircooled Diesels, with one, two, three, four and six cylinders, as well as a V-6 and a V-8. The only independently sprung bus front suspension unit was shown by Krauss-Maffei, and followed the conventional lines of unequal length welded pressed steel support arms, coil springs and a built in hydraulic shock absorber. Mercedes showed a new type of bus front axle with coil springs, hydraulic shock absorbers, anti-roll bar and hydraulic dampers on the steering arms.

AUTOMATION News Report

(Continued from page 72)

job that had required 400 man-hours by other methods, Hall said.

CONTROLS PLANT OPENS

Pilot operations are about to begin at the still-under-construction Roanoke, Va., plant of General Electric's Industry Control Dept. B. W. Mahoney, general manager, recently said the department will move gradually from Schenectady, over a period of a year or so. It will make large control devices and equipment for industry.

SHARPEN SKILLS

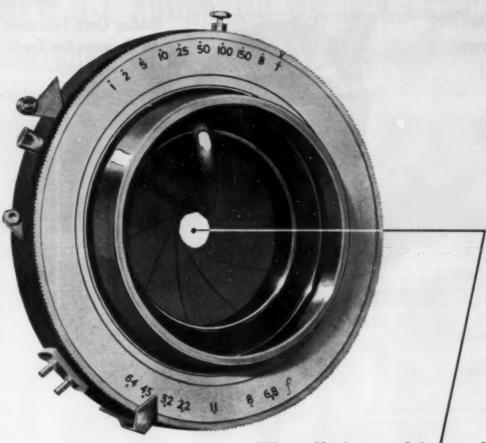
Automation came in for considerable attention at a University of Pennsylvania symposium sponsored by the Radio - Electronics - Television Manufacturers Assn. Speaking to the electronics engineers, Dr. W. R. G. Baker, general manager of the electronics division of General Electric, said that nearly 1000 plants will spend from \$250,000 to \$500,000 each year on facilities of a super-mechanical nature, controlled by electronic processes.

As a result, more jobs will be created. Employment, he said, will continue to grow by 1.25 million jobs
annually for the next 15 years. With
automation sweeping the nation into
a new era of life, management, as well
as labor, "must sharpen its skills in
preparation and adjustment," Baker
said.

AUTOMOTIVE INDUSTRIES...

is your News Magazine of Automotive and Aviation

MANUFACTURING



We roll tissue-thin steel so flat

a camera's eye shuts tighter

● Camera shutters are incredibly fast and accurate. To permit this speed and precision, Athenia Steel Division rolls tough alloy steel to a thickness of .002"... with a tolerance of only .0001".

But the toughest part of the job is keeping the steel extremely flat. It requires skill of the highest order, plus constant supervision and meticulous control.

The Athenia Steel Division of National-Standard produces this steel for the foremost camera makers, meet-

ing these really tough specifications better than they've ever been met before.

Tough jobs like this are routine at Athenia. We can roll the fussiest kinds of steel to remarkable tolerances.

We can meet any demands for high carbon strip steel. But we excel at producing the types with specifications so extreme that other manufacturers cannot or will not meet them. And we are just as eager to serve the small manufacturers as the big ones. Write us and see.



NATIONAL-STANDARD COMPANY • NILES, MICHIOAN
Tire Wire, Stoinless, Fabricated Braids and Tope
ATHENIA STEEL DIVISION • CLIFTON, N. J.
Flat, High Carbon, Coid Rolled Spring Steel
REYNOLDS WIRE DIVISION • DIXON, ILLINOIS
Industrial Wire Clath
WAGNER LITHO MACHINERY DIVISION • JERSEY CITY, N. J.
Special Machinery for Metal Decarating
WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes



Holding Close Tolerances for Transmission Gears

(Continued from page 55)

are polished and demagnetized in a Heald rotary surface grinder.

Subsequently, the long pinion is washed, then checked in Red Ring gear speeders.

Material for the short pinion is the same as for the long pinion; bar size is also 1½ in. diameter stock. The short pinion has the following specifications:

Gear Data

No. of teeth	18
Normal pitch	15.5
Normal pressure angle	
Diametral pitch	14.3518
Transverse pressure	
angle	18"48"18"
Base circle diameter	1.18726 in.
Helix angle LH.	20 * 11'30"
Lead	9.6591 in.
Addendum	0.0825 in.
Dedendum	0.0691 in.
Full depth	0.1516 in.
Corr. add. at 1.419 OD	0.0846 in.
Cir. tooth	
thickness 0.1113	3-0.1099 in.

Backlash 0.005-0.008 in. with mating gears on correct centers.

Max, tooth to tooth spacing error 0.0005 in.

Max. permissible involute profile error ±0.0005 in.

Norm. circular tooth thick theor.

Lead error per inch of face width 0 0010 in, max.

Accumulated tooth spacing error 0.0010 in. max.

Machining operations up to shaving are the same as the long pinion except of course the pinion is shorter and has only one gear member. The teeth are finish shaved in a Michigan rotary with automatic feed. From this point on operations are again similar to the work performed on the long pinion.

Eaton Mfg. Launches Expansion Of \$1.25 Million at Pump Div.

To augment facilities for making hydraulic pumps used principally in power steering for cars, Eaton Manufacturing Co. has started a \$1.25 million expansion program at its Marshall, Mich., plant. The program will include installation of new equipment and machinery and addition of about 21,000 sq.ft. of manufacturing space, which will increase total area by about 19 per cent.

NEW G-E Automatic Welding Equipment Matches Speed of Any Production Line

FILLERARC METHOD FEEDS FILLER WIRE AT ANY SPEED UP TO 1000 INCHES PER MINUTE





WIDE RANGE OF WIRE SPEEDS—up to 1000 inches per minute—makes this G-E system flexible enough for any production line. Speed is constant since system is insensitive to normal line-voltage changes.



FLEXIBILITY OF FILLERARC SYSTEM is also demonstrated by the automatic head. It rotates 360°, allowing even overhead welding. Arc is completely visible since gas instead of flux is used as the shield.



CIRCULAR OR SEAM WELDS may be made on stainless steel, copper, aluminum, and other metals—using inert gas. Fillerarc generator and carbon dioxide gas combine for low-cost, quality welds on mild steel.



CONSISTENT WELD QUALITY is a primary advantage of the G-E Fillerarc generator. It is self regulating and features a rising voltamp curve which matches the arc curve—for reliable in-line operation.

For details, write for bulletin GEC-1334, Section 713-2, General Electric Co., Schonoctady, N. Y., or call your G-E Welding Distributor.

GENERAL & ELECTRIC



I'M A TOUGH BUYER

BUT GARRETT'S GOT IT FOR QUALITY

No sir, you can't beat Garrett when it comes to top quality in small parts. Their "statistical quality control system" means every shipment you get is the finest. But quality is only part of what I like about Garrett. They manufacture and stock the world's most complete line of washers and hose clamps. Boy, when you need any kind of a lock washer, flat washer, spring washer or hose clamp you get it fast . . . most everything right out of stock.

When it comes to stampings and assemblies that's where their highspeed automatic equipment stars. Turns out exactly what you want in no time at all.

Sure, I'm a tough buyer. I want the best. I want it fast. I want it priced right. And Garrett is the place for me.

> LOCK WASHERS FLAT WASHERS HOSE CLAMPS STAMPINGS

> > Manufactured by

GEORGE K. GARRETT CO., Inc. Philadelphia 34, Pa.





(Continued from page 37)

Yale & Towne Mfg. Co. has been granted Factory Mutual approval for its full line of LPG industrial lift trucks.

Hercules Powder Co. has announced plans to enter the polyethylene plastic field with a \$10 million plant in Parlin, N. J. It will produce a new German-developed type plastic.

Eastern Air Lines has placed a huge new order with Lockheed Aircraft Corp. for \$125 million worth of new planes. The order covers 40 turboprop Electras and 10 Super Constellations.

Pennsylvania Salt Mfg. Co. has started construction of facilities for the production of potassium hydroxide at its Calvert City, Ky., works. Exide Industrial Div. of Electric Storage Battery Co. has announced a plan under which purchasers of electric industrial lift trucks may lease batteries and chargers for periods up to five years.

Lockheed Aircraft Corp. has landed orders for \$200 million in Air Force business. Biggest order of \$100 million is for new F-104A jet fighters.

Allis-Chalmers Mfg. Co. has announced two new Diesel-powered units—the 12,400-lb HD-6 crawler tractor and the 19,600-lb HD-6G tractor shovel with a rated capacity of 1½ cu yd.

Rockwell Mfg. Co. will construct a 100,000 sq ft warehouse, assembly, and repair plant at Porterville, Calif. . . . Automatic Molding Machine Co. has opened a new plant in Los Angeles, Calif., to build new automatic compression molding machines.

Harrison Radiator Div. of General Motors Corp. is producing a compact 100-lb air conditioning unit, which is mounted on the front end of an automobile, at its West Lockport, N. Y., plant.

GET MORE OUT OF ANY MACHINE BY USING LONES CHECKS SPEED SHOWS SPEED Continuents

TACHOMETERS

How can you get the most from your machinery without sacrificing the quality of your product? A JONES TACHOMETER will give you the answer in RPM's, FPM's, etc. JONES TACHOMETERS are used widely in every type of industry to check and maintain best performance of operating equipment. Both Portable (as illustrated) and permanently installed types are available at surprisingly moderate cost.

• WRITE FOR BULLETIN 146-G

ONES MOTROLA CORP.

Stamford, Conn.

when better performance

is a must,



You are assured of better performance plus economy when you design your products with hydraulic and electrical components from Pesco. On aircraft and industrial equipment, Pesco products provide continuous, uninterrupted operation despite severe conditions of shock, temperature, pressure, humidity and duty cycle.

Standard product lines assure low first cost. Simplified and proven designs mean longer service life with a low lifetime cost. As a final guarantee of dependability, every Pesco product is performance-checked before shipment.

You are invited to bring your design problem to Pesco... or write for detailed product information.



HYDRAULIC PUMPS

Single, dual and Cartridge† type, engine or electric motor driven for industrial and aircraft uses. Capacities from .7 to 60 gpm per element. Pressures to 4000 psi. "Pressure Loaded" for higher efficiency and longer service life.



HYDRAULIC MOTORS

Compact, gear-type, positive displacement motors for pressures to 1500 psi. Built for either rotation without mechanical adjustment. Starting torque efficiency over 90%.



FUEL PUMPS

Vane type for aircraft reciprocating engines. High-pressure gear type for jet engines, designed to supply main, after-burner and emergency fuel needs. Gear type for commercial gas turbine engines.



POWER PACKAGES

Optional components include: single or dual pump, control valves, relief valve, check-hold valve, reservoir. Engine or electric motor driven. Flow to 10 gpm, pressures to 1200 psi.



FUEL BOOSTER PUMPS

Centrifugal type. Tank mounted submerged or external; linemounted; or plug-in. Flow to 40,000 pph, pressures to 40 psi.



ELECTRIC MOTORS

Custom design with standardized parts for special applications. Maximum power with minimum size and weight. D-c and 400 cycle a-c types, 1/100 to 11 hp.



STEERING PUMPS

For heavy-duty power steering of trucks, buses and off-highway units. Built-in flow control and relief valve.



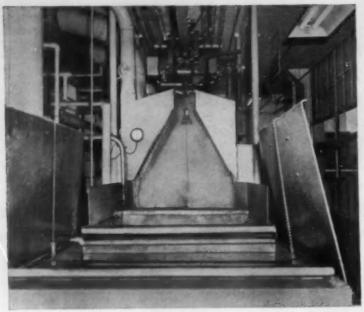
AXIAL FLOW BLOWERS

Advanced design, self-contained blowers with unmatched efficiencies. Space-saving "package" size. Single and multi-stage units for 27 v. d-c, 60 and 400 cycle a-c with capacities from 16 to 750 cfm and over (larger sizes in development).

*PESCO'S patented principle of gear pump construction.







Work carrier in Thermoil-Granodine® tank.

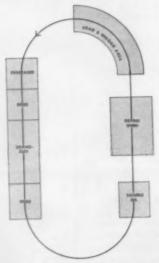
THERMOIL-GRANODINE® CUTS FRICTION 60% ON SEALED POWER PISTON RING SETS

Iron manganese phosphate coating also lengthens life, combats scuffing and cylinder scoring, speeds seating

Sealed Power Corporation has licked the problem of friction welding, galling and scoring by coating its piston ring sets with Thermoil-Granodine. This inexpensive and practical method of preventing metal-to-metal contact reduces friction up to 60% by giving rings an iron manganese phosphate surface. Also it lengthens life, combats scuffing and scoring, and speeds the normal seating time of piston rings. It is corrosion-resistant and rustproof.

These advantages are largely due to the lubricant-adsorbing characteristics of the Thermoil-Granodine surface. But they are also explained by the fact of an etching effect of the solution which produces a porous surface under the coating and leaves minute oil reservoirs in the metal when all traces of the coating have disappeared.

Write us for more information about the Thermoil-Granodine process for protecting friction surfaces, and the services offered by ACP in making it work for you—without obligation.



Process line designed and originated by Sealed Power engineers with the cooperation of ACP mens for the processing of pistons, pistone riors, cylinder sleeves, and thrust plates. The oval setup permits loading and unleading at the same position—one and of the machine.

AMERICAN CHEMICAL PAINT COMPANY, Ambier 24, Pa.
DETROIT, MICHIGAN . MILES, CALIFORNIA . WINDSOR, ONTARIO



STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMEXDED BY THE ACTS OF MARCH 3, 1923, AND JULY 2, 1946 (Title 29, United States Code. Section 233) SHOWING THE OWNERSHIP, MANAGE-MENT, AND CIRCULATION OF

AUTOMOTIVE INDUSTRIES, published semimonthly at Philadelphia 30, Pa., for October 1, 1955.

I. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Jack C. Hidreth, Conestoga Read, Devon, Pa. Editor, James R. Custer, 303-B Hampden Road, Upper Darby, Pa. Managing editor, Nose. Business manager, Jack C. Hildreth, Conestoga Road, Devon, Pa.

2. The owner in: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding I percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) Chilton Company, Chestnut and 56th Sts., Philadelphia 39, Pa.

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3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 2 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affant's full knowledge and belief as to the circumstances and conditions under which stockholders are security holders size do not appear upon the books of the company as trusteed, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shows above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

JACK C. HILDRETH

Sworn to and subscribed before me this 9th day of September, 1955.
PRILLP J. SHIRE JR.

(My commission expires January 7, 1959.)

[SEAL]



VALVE DIVISION'S NEW, LARGER PLANT relieves engine builders of valve-production problems



Bring your engine valve and other valve-train requirements to the Valve Division in its new, 500,000 square-foot plant occupied entirely by the Valve Division's manufacturing and development facilities.

Our increased capacity can easily absorb your scheduling headaches... can also provide ready-to-go facilities for engineering and research on your particular engine designs. Two problems less for automotive-, aircraft-, and stationary-engine builders.

Expanded facilities, modern production machinery and our greater flexibility assure prompt delivery of your valve-train parts to match your engine production requirements.

Let the Valve Division be the primary designer and supplier of your valve-train components . . . valves, rotators, tappets, seat inserts, locks, retainer caps, and lifters.

Valve Division



Thompson Products, Inc.

1455 EAST 185th STREET, CLEVELAND 10, OHIO

Vanadium Alloy Steels and Their Uses

Though the beneficial effects of vanadium in alloy steels have been known for many years, the ore was at one time a comparative rarity. Vanadium is still rather expensive because of the care required in processing the ore; however, there are now ample supplies for present-day applications.

Vanadium is a highly valuable alloving agent. It is an extremely powerful deoxidizer, though seldom used primarily for that purpose. Vanadium also tends to form stable carbides in steel-carbides that do not go readily into solution when heated above the critical temperature for quenching. The graingrowth-inhibiting effect of vanadium promotes a fine-grained structure over a fairly broad quenching range, thus imparting strength and toughness to the heat-treated steel. Moreover, the carbides are not prone to agglomerate during the tempering operation.

Vanadium is used in constructional steels, not only to refine the grain, but to improve the mechanical-property balance. Generally speaking, the amount of vanadium in constructional steels ranges from approximately 0.03 to 0.25 pct, though larger quantities are required in tool steels and special analyses.

A list of products containing vanadium would include certain types of spring steels, plates, gears, hightemperature steels; forged axles, shafts, and turbine rotors; and other items requiring impact- and fatigueresistance.

You are invited to consult with our staff whenever you need information about vanadium steels. Bethlehem metallurgists will gladly advise you regarding analyses, heattreating, machining, and anticipated results. Please remember that the services of these technicians are yours for the asking, and that no obligation is implied.

And may we point out, too, that Bethlehem makes all AISI standard alloy steels, as well as specialanalysis steels and the full range of carbon grades. Call upon us for your alloy steel requirements; now and always, we will endeavor to meet your needs promptly.

If you would like to have a reprint of this advertisement, or of the entire series from I through XII, please write to us, addressing your request to Publications Dept., Bethlehem Sted Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Expert Distributor: Bethlehem Steel Export Corporation



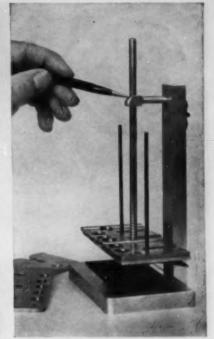
BETHLEHEM STEEL



UNIFORMITY of weight and thickness of diaphragm material is av sured by beta ray testing. Thickness of the coatings is constantly controlled to meet the most exacting requirements.



SCRUB RESISTANCE of "Fairprene" diaphragm material is demonstrated by scrub test. Coating compound is securely bonded to fabric...is virtually unaffected by constant flexing and friction.



CONTROLLED SENSITIVITY is measured by "S-Fold Pliability Test." Immersion in oils and aromatic fuels followed by testing at extremes of temperature demonstrates the control of pliability of diaphragms made with Du Pont "Fairprene.



POROSITY of diaphragms of "Fairprene" to gases is tested by subjecting diaphragms to high air pressure under water. Absence of air bubbles indicates extreme pressures withstood by "Fairprene" coated fabrics.



FLEX RESISTANCE is shown by this flexibility test. Vibrator telescopes y of active service into hours, yet after this rugged treatment "Fairprene" diaphragm

For seals, gaskets, diaphragms— Du Pont Fairprene® products pass the test!

Automotive engineers are taking a close look at Du Pont "Fairprene" coated fabrics for use as resilient parts-and with good reason!

Diaphragms, seals and gaskets of "Fairprene" show exceptional resistance to the deteriorating effects of oil products-gasoline, kerosene, oil and grease. They resist abrasion and permanent distortion, remain smooth and flexible. Lightweight "Fairprene" products give years of service despite temperature extremes and have excellent burst and tear strength . . . exceptional resistance to loss of coating.

Though "Fairprene" products are now used as seals, gaskets and disphragms, they can be effectively employed in many other automotive parts.

It will pay you to investigate possible new uses for "Fairprene" coated fabrics in your design. Du Pont engineers will gladly work with you in developing special grades of "Fairprene" to meet your own specifications. For further information, just clip and mail

e"Fairprene" is Du Pont's trade-mark for coated fabrics, sheet stocks and cements.

DU PONT INDUSTRIAL COATED FABRICS

E. l. du Pont de Nemours & Company (Inc.) Fairfield, Conn.



BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

Mail coupon for further information . . .

E. I. du Pont de Nemours & Co. (Inc.) Fabrics Division, A-511, Fairfield, Conn.

I am interested in "Fairprene" Industrial

) Have a representative call.

) Send booklet "Coated Fabrics for Diaphragms.

Address

City_



On the assembly line of the auto industry's newest V-8 engine, specially designed

Johnson main bearings fit perfectly into position with a touch of the fingers.

Read Why The Makers Of This New V-8 Chose Johnson As A Supplier Of Bearings

Months before the introduction of this new engine, Johnson engineers were called in to consult with automotive engineers in the customer's plant on specifications for bearings in crankshafts, connecting rods and camshafts.

All connecting rod and main bearings were specified as super micro-babbitt with steel backs. Lead base babbitt was selected except in the flanged No. 3 main bearing which takes the thrust. This bearing was to be tin base babbitt which gives excellent resistance to wear under thrust loading.

Trial lots of bearings were subjected to exhaustive testing in the research lab and on the proving grounds.

Result? Johnson met the specifications perfectly and was awarded a large share of this customer's bearing needs. Receiving and inspection men, supervisors, and workmen welcome the arrival of Johnson Bearings on the assembly line because it means uninterrupted production—less headaches for all concerned.

Johnson supplies original equipment engine bearings to the leading automotive companies because Johnson can be depended upon to deliver the exacting tolerance, mirror like finishes, and carefully compounded chemical analysis of the metals required, bearing after bearing, order after order, at competitive prices.

If you have a hand in the production of engines—automotive, marine and industrial, either gasoline or diesel—and you have a problem in the design, construction or operation of bearings, a Johnson engineer will welcome the opportunity to talk it over without cost or obligation. Call, write or phone sleeve bearing headquarters, the Johnson Bronze Co., 625 S. Mill St., New Castle, Pa.



Johnson Bearings

TOUTS Heat Transfer News

YOUNG RADIATOR COMPANY, RACINE, WIS.

Allis-Chalmers SPECIFIES Young Radiators for models CA and WD-45 Tractors

BILLY BTU SAYS:)

"here is useful design date for Redistrier Cooling equipment".

Radiator type and evaporative type cooling equipment using dry air as the cooling medium should be designed to operate under the DRY

BULB air temperatures to be expected during the summer in the locality where the equipment is to operate. Equipment using cooling effect due to water evaporation is designed to operate under the WET BULB air temperatures to be expected.

For proper design, it is not satisfactory to use either the maximum air temperature, nor the average air temperature. Use of the maximum air temperature for design would result in the selection of cooling equipment too large to be economical, since it would be fully loaded only under the most extreme temperature conditions. Use of average temperature for design purposes would result in selection of equipment too small to handle the cooling load during a great portion of the operating time. It is necessary, therefore, to use some figure between maximum

and average air temperatures.

The Young Radiator Company has prepared and offers to engineers engaged in the design and application of radiator type and evaporative type cooling equipment, data taken from the results of five years of summer records in the United States. This data may be used and considered as applying to an

average year.

For a copy of this data, write for Bulletin 654, Young Radiator Company, Racine, Wisconsin.



WRITE FOR FREE DESIGN TEMPERATURE BULLETIN OF THE UNITED STATES

Helpful four-page Bulletin briefly discustes atmospheric cooling equipment design temperatures for the United States. Wet and dry bulb maps are fully illustrated with isothermal lines. Write Young Radiator Campany, Dept. 185.1. Racine, Wisconsin. Drawn Tank Radiators Meet All Tractor Cooling Loads

Allis-Chalmers Manufacturing Company, West Allis, Wisconsin, uses Young Radiator Company drawn tank Radiators on two powerful tractor models.

Built to withstand the constant strain and stress put upon tractors, these



Cross-sectional view of Allis-Chalmers Model WD-45 Tractor with Young Radiator.



View of Allis-Chalmers CA Tractor and forage harvester making grass silage.

Young units must cope with high internal water impact pressures due to sudden starting and stopping.

To overcome these and other torsional stresses and long term vibrations, full wrap-around type terne plate side members secure tanks, headers and core as one piece. Brass top and bottom tanks are formed as one piece and have die-formed beads for reinforcement. Fabricated brass inlet with maximum flow area provides minimum resistance to coolant circulation.

This Radiator also features Young patented double-grip, two-way headers with lapped joint solder sealed to tanks as a permanent, leak-proof assembly. Fully soldered double-lockseam tubes with corrugated fins makes for strength and maximum air turbulence and greater heat transfer.

For further details, write Dept. 105-L. Young Radiator Company, Racine, Wisconsin.



Young Radiator Company drawn tank Radiator used on Allis-Chalmors Model CA Tractor.



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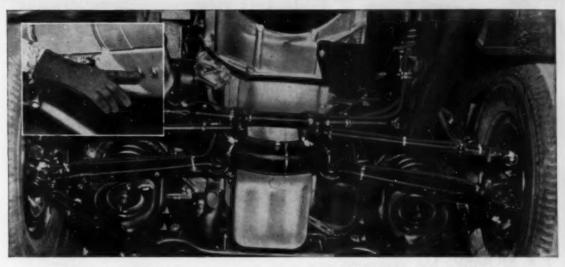
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Rugged, flexible tubing of ZYTEL® nylon resin used throughout new power lubrication system

Newest addition to power accessories for passenger cars is the Multi-Luber, a development of the Lincoln Engineering Co., of St. Louis, Missouri.

The system consists of a control button on the instrument panel and an injector pump located in the engine compartment. Tough, flexible lines of "Zytel" nylon resin extend from the pump to 12 key points on chassis, suspension and steering systems.

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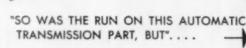
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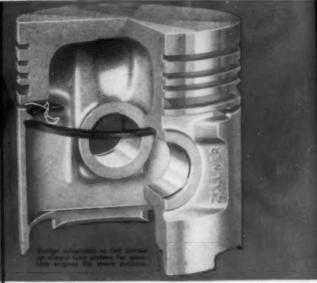
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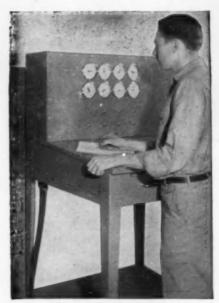
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